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PROCEEDINGS

OF THE

ACADEMY OF NATURAL SCIENCES

OF PHILADELPHIA.

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1861.

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PHILADELPHIA:

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1862.



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*January 1st, 1861.*

Vice-President BRIDGES in the Chair.

Eighteen members present.

Papers were presented for publication entitled,

“Catalogue of the Marine Fishes of the Eastern Coast of North America from Greenland to Georgia, by Theodore Gill.”

“Description of a new species of the genus *Anableps* of Gronovius, by Theodore Gill.”

“Synopsis of American Cretaceous Brachiopoda, by Wm. M. Gabb.”

Which were referred to Committees.

Mr. Sergeant announced the death on the 25th ult. of Mr. John H. Markland; also, at London, on the 8th ult., of Dr. Charles Huffnagle, late members of the Academy.

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*January 8th.*

Vice-President VAUX in the Chair.

Twenty-six members present.

A paper was presented for publication entitled

“On the classification of the *Eventognathi*, or *Cyprini*, a sub-order of *Teleocephali*, by Theodore Gill.” Which was referred to a Committee.

An extract of a letter was read from Col. J. D. Graham, dated Chicago, Dec. 17th, 1860, informing the Academy of the discovery by him of a diurnal tide in Lake Michigan.

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January 15th.

Vice-President VAUX in the Chair.

Thirty-one members present.

Dr. Leidy stated that in a communication to the Academy, by Dr. Mordecai, published in the last number of the Proceedings, the author remarks as the result of his observations, that the food of the shad consists of marine algae. A few weeks since Dr. L.'s housekeeper had incidentally called his attention to a shad, obtained in market, which appeared to her remarkable from the stomach being filled with small fishes. Dr. L. examined the shad to assure himself that it really was that fish, and submitted the stomach and contents to Mr. C. C. Abbott, who informs him in a note that the contents consist of nine small marine fishes, as follows: 3 *Hydrargyra swampina*, 5 *Pœcilia latipinnis*, and 1 *Cyprinodon ovinus*. Mr. Abbott adds, that in his dissections of the shad he had frequently detected the remains of cyprinoids in the contents of the stomach.

Mr. Slack called attention to specimens of *Mosasaurus* bones presented this evening. The animal was remarkable for its small size, and on account of its position where found, viz. in the upper stratum of the marl.

January 22d.

Mr. LEA, President, in the Chair.

Thirty-nine members present.

Papers were presented for publication entitled

"Notes on Ants in Texas, by S. B. Buckley."

"Descriptions of new species of *Scolopendra* in the collection of the Academy, by H. C. Wood, Jr."

"Observations on *Cottus Copei* Abbott, by C. C. Abbott."

"Appendix to the Monograph of the *Philypui*, and description of the genus *Lembus* of Günther, by Theodore Gill."

And were referred to Committees.

Mr. Lea read the following extract of a letter from Dr. Lewis, of Mohawk, N. Y.

"I find three species of *Paludina* in the Erie Canal and Mohawk River at this place. Mr. Binney, after examining them, pronounces them one species—*decisa* Say,—regarding them merely as varieties. My reasons for regarding them as three species are as follows: The large species which I shall call *integra* Say, for the present (and until it is satisfactorily shown by reference to Say's *integra* from the original locality that it is a different species,) is the most ponderous shell of the three species. The *Embryonic young* attain the largest size (before exclusion from the parent) of the three species. The next species I will call *decisa* Say, though it is usually perfect at the apex, as well as the preceding. This shell is of a thinner texture, and the color of the epidermis is a darker tint, green. The *Embryonic young* at exclusion are of a delicate pale willow green. The third species I have for several reasons felt disposed to regard as *rufa* Hald. This does not attain so large a size here as the preceding species. The height of the shell is less, proportioned to its width. The central portions of the body whorl a little prominent, almost sub-angular in some instances, a little flattened towards the sutures. The epidermis olivaceous, with purpureous tinge on the centre of the whorl, fading above and below. The interior pink, margined above and below and at the aperture with white. *Embryonic young* smaller than in *integra* and *decisa*, and of a delicate pale pink color. The soft parts differ as do the shells. The habits of

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the animals also differ, and the crowning evidence of this distinction in a specific point of view, is the absence of all intermediate forms and varieties, each species preserving its integrity, under the operation of the same law that preserves the purity of species of *Unio*, where from 30 to 50 species are found in one stream, as is seen in some of the western rivers."

January 29th.

MR. LEA, President, in the Chair.

Thirty-three members present.

On report of the respective Committees, the following papers were ordered to be published in the Proceedings :

Description of a new Species of the Genus **ANABLEPS** of Gronovius.

BY THEODORE GILL.

There has recently been sent to the Smithsonian Institution from Panama, by Captain J. M. Dow, a new species of the genus *Anableps*. The number of the species of the genus is now increased to four, all of which, with the exception of the one now to be described, are from the Caribbean Sea, along the northern coast of South America.

Preliminary to a description of the new species, we give a diagnosis of the genus, in order not to be obliged to insert as specific characters those which are really generic.

Subfamily ANABLEPTINÆ Gill.

Genus ANABLEPS (Artedi) Gronovius.

*Synonymy.*

*Anableps Artedi, Linn.*, in first editions of *Systema Naturæ*.

*Cobitis sp. Linn.*, in later editions of *Systema Naturæ*.

*Anableps Gronovius Zoophylacium.*

Body elongated, anteriorly depressed, posteriorly compressed.

Scales moderate or small, cycloid, covering almost the entire head and body; those on the head, anterior to the nape, larger and less imbricated. The base of the caudal fin and the anal appendage of the male are also covered with scales.

Head depressed, cuneiform in profile, oblong above, gradually diminishing in width to the snout.

Mouth anterior and transverse, opening downwards and forwards. Upper jaw projecting beyond the lower. Intermaxillary bones with the ascending process represented by simple knobs. Maxillaries entirely lateral, and excluded from the composition of the mouth. Dentary flattened.

Teeth acute, only on the intermaxillaries and dentaries; in the former in a broad band, the anterior ones larger and moveable, as in *Poecilia*; the posterior villiform and immovable. Those of the lower jaw nearly horizontal and principally in one row on the front of the dentaries.

Eyes situated in the anterior half of the head, oblique, and protected by the elevated arches of the frontal bones. The cornea and iris are divided into two more or less unequal portions by a horizontal band.

Nostrils double; the anterior at the anterior and inferior edge of the nasal bones; the posterior oblique fissures in front of the eyes.

Branchiostegal membrane deeply excavated, the fissure extending to the anterior borders of the eyes. Branchiostegal rays five.

Dorsal fin higher than long, situated far behind, between the anal and caudal.

Anal in the females of nearly the same form as the dorsal; in the males with a large conical appendage in front.

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Pectoral fins suboval, directed downwards and inwards, and externally concave.

Ventrals situated nearly midway between the pectoral and dorsal.

Prof. Jeffries Wyman has published interesting facts respecting the embryology of the *Anableps Gronovii* of Valenciennes (or *Anableps tetrophthalmus* Linn.) in the fifth volume of the Proceedings of the Boston Society of Natural History, page 80, and in the sixth volume of the American Journal of Science and Art.

Mr. J. P. G. Smith has published observations on the habits of a species of the genus in the Proceedings of the Zoological Society, for 1850, at page 53.

#### ANABLEPS DOWEI Gill.

The body is elongated, anteriorly depressed and flattened, and posteriorly compressed as in the other species of the genus. The height of the trunk, at the insertion of the ventral fins is nearly an eighth of the extreme length from the snout to the margin of the caudal fin. The width is greatest between the pectorals and ventrals, and equals fourteen-hundredths of the length; thence it nearly uniformly diminishes towards the base of the caudal fin, which is much compressed.

The head is elongated, semiconical in profile, above straight and continuous with the back. The height at the vertical of the operculum equals an eleventh of the total length. The length of the head itself enters five times in the total. The head above is flat and level from the nape, and between the raised orbits to the upper jaw; its breadth at the nape slightly exceeds two-thirds of its length; that before the eyes equal three-fifths of the same.

The eyes exceed in their diameter one-fifth of the length of the head; they are distant from the anterior borders of the nasals, a quarter of the head's length: the interorbital space equals a seventh of the same. The interval between the upper jaw and the angle of the preoperculum equals three-fourths of that between the jaw and the margin of the operculum.

The eyes are circular; the portion below the bridle of the conjunctiva is as large or larger than that above.

The dorsal fin commences between the posterior sixth and seventh tenths of the length. Its basal length is only equal to a twentieth of the total length, and scarcely exceeds half its height. Its median rays are highest, the margin being convex.

The anal fin of the male has nearly the same position and structure, as that of the same sex in *Anableps tetrophthalmus*.

The caudal fin is somewhat obliquely truncated, the lower rays being slightly longest. Its greatest length forms a sixth of the total. Its basal third is covered with closely adherent scales.

The pectoral fins do not quite equal in length a seventh of the total; they are separated from each other at their bases by an interval slightly exceeding half their length.

The ventrals commence between the fourth and fifth tenth of the total length; their length equals a tenth of the same.

In structure and form, the various fins do not differ from those of the allied species.

The number of rays is as follows: D.  $8\frac{1}{1}$ . C. 5, 16, 3. R. 21. V. 6.

From the axilla of the pectoral fin to the base of the caudal, there are about sixty-eight rows of scales, forty-nine of which are in advance of the dorsal. Each scale is more or less subcircular, often higher than long, with concentric striæ, surrounding a nucleus placed considerably anterior to the centre, and posteriorly crossed by about fourteen radiating striæ.

The color is a dark black brown on the head, back and sides. A broad, longitudinal, golden-colored band traverses the sides and terminates at the

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caudal fin; the band is itself bordered with blackish below, which is much more distinct behind the ventrals. The sides of the head as well as the inferior surface of the body are also of a deep yellow color, the line bounding the yellow of the head passing under the eyes, and is continuous at the axilla of the pectorals with the lateral band. The dorsal, caudal and most of the pectorals, are of a lighter color than the back; the interior rays of the latter are yellowish.

A single specimen of this new species of *Anableps* was obtained by Captain J. M. Dow.

It is interesting as being the first representative of the genus that has been discovered on the Pacific coast. We dedicate the species to its discoverer, who has added much to our knowledge of the Fauna of the western coast of Central America, and who has forwarded to the Smithsonian Institution many new species of Fishes, Crustaceans, and other animals, among which is the type of the singular new Portumnoid genus *Euphyllax* of Stimpson.

The following synopsis of the species of the genus will exhibit the comparative differences between them.

α. Squamæ in serie longitudinali cerciter 70. Color superne olivaceo-fuscus; fascia laterali et corpore inferne flavis.

ANABLEPS DOWEI Gill.

*Synonymy.*

*Anableps Dowei Gill*, Proceedings Acad. Nat. Sciences, supra 1860.

β. Squamæ in serie longitudinale 50—55; color superne flaviceo-virescens; lateribus lineis longitudinalibus tribus vel quatuor ornatis.

ANABLEPS TETROPTHALMUS Bloch.

*Synonymy.*

*Anableps lineis quatuor longitudinalibus ad utrumque latus; processu tubulato ad pinnam ani Artedi* in Seba's Thesaurus rerum naturalium, vol. iii. pl. xxxiv. fig. 7, 1758.

“ *Artedi*, Genera Piscium, p. 25, genus xx.

“ “ *Species Piscium*, p. 46.

*Anableps Gronovius*, Zoophylacium, p. 117, No. 350, pl. i. figs. 1, 2, 3.

“ *Gronovius* Museum Ichthyologicum, vol. i. p. 12, No. 32.

*Cobitis anableps*, *Linnaeus*, Systema Naturæ ed. x.

“ *Linnaeus*, Systema Naturæ, ed. xii., gen. 173, No. 1.

*Anableps tetrophthalmus Bloch*. Natargeschichte der ausländischen Fische.

“ “ *Bloch*. Systema Ichthyologiæ, *Schneid.* ed.,

“ “ *Lacepede*, Hist. Nat. des Poissons, vol. v. 1803.

“ “ *Cuv. et Valenciennes*, Hist. Nat. des Poissons, vol. xviii. p. 252.

The preceding is only a portion of the synonymy of the species. On account of the remarkable structure of its eyes, it has been referred to in numerous works on Natural History and Anatomy. Such allusions have not been deemed of sufficient importance to refer to.

γ. Squamæ in serie longitudinali cerciter 85-90 ordinatæ. Color superne olivaceo-virescens, inferne albescens.

ANABLEPS MICROLEPIS Müll.

*Synonymy.*

*Anableps microlepis Müller and Troschel*, Monatsberichte der Acad. 1844, p. 36. 1861.]

- Anableps microlepis* *Troschel*, *Archiv. fur Naturgeschichte* for 1845, vol. ii. p. 200 (abstract.)
- Anableps coarctatus* *Val.* *Hist. Nat. des Poissons*, vol. xviii. p. 266, pl. 540, 1846.
- Anableps microlepis* *Müll.* and *Troschel* in *Schomburgh's Reisen in British Guiana*, vol. iii. p. 632.
- Corpus magnitudine fere ut in* *Anableps tetrophthalmus*.

## ANABLEPS ELONGATUS Val.

*Synonymy.*

- Anableps elongatus* *Val.* *Hist. Nat. des Poissons*, vol. xviii. p. 267, pl. 541, 1846.
- Corpus gracilius*.

## On the classification of the EVENTOGNATHI or CYPRINI, a suborder of TELEOCEPHALI.

BY THEODORE GILL.

In studying the species of Cyprinoids obtained by Captain J. H. Simpson in his expedition across the continent in 1858-1859, we were led to investigate the principles of classification adopted for the arrangement of the family of Cyprinoids, as it has been restricted by most recent naturalists. Our studies have led us to the belief that the Cyprinoids do not form a natural family, but rather a suborder, and that the suborder itself may be divided into a number of natural families.

## Suborder EVENTOGNATHI Gill.

This suborder embraces the numerous species known to the inhabitants of the United States as "Shiners," "Dace," "Roach," "Carp," "Suckers," &c., and is represented by species in the fresh water streams and lakes of almost every portion of the globe, with the exception of the continent of South America; they are there replaced by the herbivorous Characins.

Notwithstanding the cosmopolitan distribution of the suborder, there are few or no groups of fishes, whose mutual affinities are more unknown, and whose nomenclature and generic distinctions are so uncertain. Genera that are certainly very nearly allied, and even identical with each other, have been placed at almost opposite extremes of the family. Very closely allied species even have been equally far removed from each other, yet there are few groups which have been so much studied by naturalists as this has been.

The species of Asia have been especially studied by McClelland, Heckel, and by Dr. Bleeker; those of Europe, by Cuvier, Agassiz, Heckel, Kner, and the Prince of Canino. The American species have been arranged and described by Agassiz, Baird and Girard. All the known species found in every part of the world have been described by Valenciennes, and Bleeker has very recently published a synopsis of the entire suborder, in which all the known genera are described, and arranged in a new systematic order. With the full knowledge of all that has been done by those great zoologists, we have still no hesitation in asserting that much yet remains to be done, and that none of the proposed classifications or groupings of the genera and species are founded in nature.

The suborder, as understood by us, includes only the true Cyprinoids of Agassiz, without teeth in the jaws, and with large falciform lower pharyngeal bones. It thus excludes the *Cyprinodontoids*, and all allied groups. Thus restricted, it is an exceedingly natural group, and corresponds to the family of Cyprinoids of most naturalists. But in the suborder, there exist several groups which differ essentially in form or anatomical peculiarities, and which appear

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to be entitled to family rank. The chief and typical family is much the most extensive and widely distributed. The others are small and much more restricted in geographical distribution.

The following synopsis will exhibit the most obvious characteristics of the different families, and their geographical distribution. We do not pretend to group the various genera into subfamilies or tribes, where so many have failed; it would be presumptuous for us, with the material at hand, to offer such an arrangement.

#### Family I. HOMALOPTEROIDÆ Gill.

##### *Synonymy.*

Homalopteraformes *Bleeker*, *Natuurkundig Tijdschrift voor Nederlandsch Indie*, vol. xx. p. 422 (subfamily.)

*Balitora Cuv. et Val.* *Hist. Nat. des Poissons*, vol. xviii. p. 91, (genus.)

The body and head are depressed, and the inferior surface plane. The mouth is inferior and of small size. The pectoral and ventral fins are in the same plane, horizontal and subdisciform. The pectoral fins have numerous and branched rays. There are no spines before any of the fins. The pharyngeal bones have a single row of conical teeth.

This family exactly corresponds to the subfamily of Homalopteraformes of Dr. Bleeker, and the characters above given are nearly translated from his. The species are peculiar to the streams of India.

#### Family II. COBITOIDÆ Fitzinger.

*Cobitidæ Fitzinger.*

*Acanthopsides Heckel and Kner*, *Die Süßwasserfische des Osterreichischen monarchie*, p. 296.

*Cobitiformes Bleeker*, *Natuurkundig Tijdschrift voor Nederlandsch Indie*, vol. xx. p. 421.

The body and head are never depressed, but either subcylindrical or slightly compressed. The scales are very small, and almost concealed in the smooth mucous skin. The mouth is subterminal, the snout being little protuberant. The lips are thick, and provided with from six to twelve barbels. The pectoral fins have a broad, vertical base, and are inserted in the usual manner on the sides above the breast. The pectoral fins have each a simple spine; the others are without. The pharyngeal bones have a single row of teeth. The branchial apertures are small and restricted to the sides.

This family is confined to the fresh-water streams and lakes of Europe and Asia, both temperate and tropical, and the islands of the Sunda Molluccan Archipelago. No species are found in either of the Americas. Are they not replaced in the latter continents by the fresh water Siluroids and Trichomycteroids?

The family may be divided in two different subfamilies, distinguished by the position of the dorsal fin. In the typical *Cobitinae*, that fin is placed immediately over the ventral fins. In the other group, which may be called *Acanthopthalminae*, the dorsal is situated over the space between the ventral and anal fins. Of the former four genera are known, and of the latter two.

#### Family III. CYPRINOIDÆ (Cuv.) Gill.

##### *Synonymy.*

*Cyprinidæ partim Agassiz*, auct.

*Cypriniformes Bleeker*, *Natuurkundig Tijdschrift voor Nederlandsh Indie*, vol. xx. p. 422 (subfamily.)

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The body is oblong or moderately elongated, compressed or subcylindrical, and covered with conspicuous scales of various size.\*

The barbels vary in number from two to four, and in numerous genera are even entirely absent. The pectoral fins have broad vertical bases inserted in the usual manner on the sides above the breast; they have each a simple ray. The dorsal and anal fins are either with or without spines, which themselves are either simple or dentated. The pharyngeal bones have one constant row of normally five teeth, or occasionally four, and often one or two supplementary rows of from one to three smaller teeth. The branchial apertures are of moderate size, and separated from each other by an isthmus of little or moderate width.

The Cyprinoids, as limited above, form a very natural and homogeneous group; its genera have not yet been satisfactorily divided among subfamilies, nor have even the genera been naturally approximated to each other. The distribution of the species is almost world-wide, South America being the only continent in which they are not found.

#### Family IV. CATASTOMOIDÆ Gill.

##### *Synonymy.*

Catastominae Heckel.

Catastomini Bleeker, *Natuurkundig Tijdschrift voor Nederlandsch Indie*, vol. xx. p. 427 (stirps.)

Catastomus Lesueur, *Journal of Academy of Natural Sciences of Philadelphia*, vol. i. (genus.)

The body is moderately elongated and subcylindrical, or oblong and compressed, covered by conspicuous scales. The mouth is always concealed from above by the protuberant snout, and surrounded by fleshy lips. There are no barbels. The pectoral fins have their vertical bases inserted in the usual manner on the sides above the breast. The pharyngeal bones have numerous teeth closely approximated, like those of a comb, in a single row, and compressed at right angles to the bone. The branchial apertures are moderate, and separated by the isthmus.

The Catastomi have some external and anatomical characters peculiar to themselves and distinguishing them from the other families of this suborder. They are, therefore, now regarded as forming a distinct family. They appear to be peculiar to North America. A species of Cyprinoid from Siberia has been described by Tilesius, which has been generally referred to the genus *Catastomus*, but it is too little known to positively refer it to any known genus. As, however, there are arctic species of the family, the Tiesian species may quite possibly be a true member of the group.

The family of Catastomoids may be divided into three subfamilies, chiefly characterized by the form of the body and the comparative form and length of the dorsal and anal fins.

The Catastominae have an oblong or moderately elongated and anteriorly subcylindrical body; the dorsal fin subcentral and nearer the snout than the margin of the caudal fin; it is short and subquadrate, with from eleven (3,8) to sixteen (3,13) rays. The ventral fins are under the anterior, median or posterior parts of that fin. The anal fin high and short, placed nearer the base of the caudal than of the ventral fins.

The Cycleptine are characterized by the elongated body, which is subcylindrical before, and by an elongated and falciform dorsal fin commencing over the interval between the pectoral and ventral fins, and extending as far back as the beginning of the anal fin.

\* The genera *Autopyge* of Heckel, *Phoxinellus* of Heckel and *Meda* of Girard are destitute of scales.

The third subfamily is composed of species having an oblong-oval and compressed body. The dorsal fin is elongated, commencing over or before the ventral fins and proceeding backwards at least as far as the commencement of the anal fin; the anterior rays are usually much longer than the others. To this group the name of *Bubalichthyinae* may be given. *Carpiodes* is the typical genus, but it would scarcely be proper to modify that name by the termination indicating a subfamily; we have therefore accepted the above modification of the name *Bubalichthys* of Agassiz proposed for a genus of this subfamily.

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#### Note on Ants in Texas.

BY S. B. BUCKLEY.

The cities of the Cutting Ant (*Myrmica Texana*) are sometimes much larger than those described by me in an article published in the *Journal of the Academy*. During the summer, I have measured some which extended beneath a surface having an average diameter of seventy feet; and in one instance, their town was spread beneath an area of about one hundred feet. Their cellars, from six inches to two and three feet in diameter, are beneath this surface to the depth of from twelve to eighteen feet. The dirt brought up is in the form of a crater, to the edge of which they carry the ground excavated, where it is dropped, and rolls down the sides of the volcano-like hill, which is seldom more than eighteen inches high. The storms level the hills, and new ones are formed on them, until the dirt excavated is sometimes three feet deep. A new city, or when more rooms are made in an old one, has at the surface the appearance of a model volcanic region with isolated craters and mountain ranges. In an old established town the surface of the ground around the main entrances is nearly level, in order that stores for home use may be easily brought in along their roads, extending into the country in all directions. Besides these paths there are underground avenues—as was mentioned in a former paper—whose outer doorways are several hundred feet distant from town, through which most of the grain and leaves used by them is carried. The digging of these tunnels is begun near the lower cellars, from whence they are extended to the outer entrances, around which excavated dirt is seldom if ever found. That they store up food is very probable, nor can there be much doubt of it, since it is well known that they often abstain from work during several days in succession in the winter time. It is also well known, in the region infested by them, that they carry large quantities of grain and leaves into their abodes. I have often seen the margins of their paths covered with segments of green leaves, where they are left to dry, after which they are taken below. The green fruit of the elm is treated in a similar manner. It is true that leaves and fruits are carried into town in a green state, but they surely would not dry a portion unless they wished to preserve it for future use. They do most of their work in the night time, especially in the summer season, when they do not labor during the heat of the day. On one occasion our tent was inadvertently erected near one of their towns, and as we were about to spread our blankets for sleep, we found the ground almost covered with ants. We were driven to platforms for slumber. In the meantime the ants were actively engaged in carrying home fragments of biscuit and other things which had been dropped from our table; other parties of them packed the grains of corn strewed on the ground near the feed box of our mules and horses. I had been told that “cutting ants” could carry the largest grains of corn, but did not believe it; but at that time I saw some big grains move slowly along the ant path, and on close scrutiny could see that said grains were carried on the backs of the little ants. We were encamped near Judge Eastland’s, in Bastrop County, and the next morning the Judge brought over some bits of lead immersed in molasses, to test the strength of the ants. The pieces of lead were three and four times

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larger than the ants, yet the ants being fond of sweet would struggle, until they succeeded in getting the sweetened metal on their backs, when they marched homeward. They are not fond of salt, and would not eat bacon or beans which had been cooked with it.

Among these ants are some big-headed giants who apparently are rulers and superintendents. I have frequently seen them move among the crowd here and there, as if to see that all were on duty. Not working themselves, they urge others to the task. It is said they punish delinquents by biting and shaking them, but I have not seen any such penalty inflicted. It may be that these large ants are the elders whose age exempts them from labor, and entitles them to the respect and submission of the younger of this community.

A gentleman in Bastrop County told me that to preserve his shelled grain and meal from the "cutting ants" it was suspended in sacks by tarred ropes; fresh tar being occasionally added. It is difficult for them to shell corn; hence corn in the ear is rarely disturbed by the "cutting ants." I have not met with these ants north of latitude thirty one degrees, but how far east or west they extend I cannot tell. They are more numerous in the vicinity of rivers and water, but I have never seen their abodes in a bottom subject to overflow.

When I was in Lampasas County last October, at Swenson's Saline, on a hillside, I overturned a large rock, which left exposed a number of the cellars of the stinging ant, (*Myrmica malefaciens*.) In some of these cellars were large quantities of the seeds of the amaranthus and other plants, nicely stored for future use. A gentleman in San Saba County informed me that, after a heavy rain, the "stinging ants," at one of their dens near his wheat field, brought up at least half a bushel of wheat and spread it around their outer door to dry, after which it was again conveyed below.

In this climate, where during the winter cold and warm weather alternately prevail, many species of ants do not become torpid; but in their deep cellars where the cold does not come, they lay up food for use in times of northers, and when the warm weather comes their labors are renewed. It is seldom that they are hindered by cold from work more than a week at any one time.

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#### Descriptions of new Species of *Scolopendra*, in the collection of the Academy.

BY HORATIO C. WOOD, JR.

*S. byssina*, nobis.

*S. saturate viridis*, capite castaneo; antennis ? 18 articulatis; dente mandibulari gracile, dentibus labialibus 10, parvis, nigris; superficie ventrali brunneo-olivacea; pedibus gracilibus, antennisque luteolis, postremis articulo basali intus 3, subtus 2 spinis, processu angulari bifido vel trifido; appendicibus analibus lateralibus punctatis, singula spinis apicalibus 3. Long. unc. 3.

*Hab.* Florida?

*S. parva*, nobis.

*S. viridi-brunnea*, segmentis plerumque saturatè viride marginatis; antennis viridibus, 25 articulatis; dentibus 8, nigris, obtusis; pedibus postremis robustis, articulo basali margine haud elevato, intus 5 spinulis, subtus 12-15 spinulis, processu angulari magno, quadrifido; appendicibus analibus lateralibus punctatis, singula spinis apicalibus 4-5 et altero marginale armata. Long. unc. 3.

The first segment of the body is the smallest, the third next. The sutures between sternum and episternum well marked, those between scuta and episcuta barely traceable. The preterminal scuta is very large, its lateral margins in all our specimens are regularly arched. The terminal scuta has a strongly depressed central groove, marking, we suppose, the line of embryonic coalescence of the two primitive scuta.

*Hab.* Mountains of Georgia. Dr. LeConte.

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*S. castaneiceps*, nobis.

*S. viridis*, capite antennisque castaneis; segmentis margine posteriore caeruleo tincto; antennis 25 articulatis; dente mandibulari producto, gracile; dentibus labialibus 10, intimis tribus utrinque coadunatis; pedibus plerumque luteolis; postremis saturate viridibus, articulo basali intus quinquespinoso, subtus spinis 9 serie triplici dispositis; appendicibus analibus lateralibus brunneis, elongatis, singula spinis apicalibus 5; superficie ventrali sordidé viride. Long. unc. 3·75.

Prebasilar fold connate with basilar segment; the suture, however, well marked, existing as a deep groove. First pair of legs tinged with chestnut. Preanal scale quadrate, much narrowed posteriorly, impressed with a longitudinal sulcus.

*Hab.* Texas. Dr. Rand.

*S. polymorpha*, nobis.

*S. olivaceo-brunnea*, capite dilute castaneo; antennis 30 articulatis, pedibusque luteolis; dente mandibulari tuberculo basali magno; dentibus labialibus 8, maximis, intimis duobus utrinque coadunatis, externis sejunctis; segmentis margine posteriore nigro-viride, marginis lateralibus plerumque liberis; pedibus postremis robustis, articulo basali intus 7-10 spinis, subtus 8-12 spinis armato, processu angulari aut bifido aut trifido aut quadrifido; appendicibus analibus lateralibus, singula 4-5 spinis apicalibus. Long. unc. 3.

Prebasilar fold apparent, but connate with the rather large basilar segment. First segment of body very small, suture between scutum and episcutum barely traceable, that between sternum and episternum much more distinct. Basal joint of last pair of legs, above flattened and apparently grooved, below very convex; the internal surface having near to its proximal end a group of from five to seven spines, and several scattered ones on its distal portion; lower surface with from eight to ten spines disposed 1 in rows. This may be considered the typical arrangement, but we have very numerous departures from it; in some individuals the spines are irregularly scattered over the whole interior and inferior surfaces. The color also varies greatly, shading off from that given above, to a testaceous-chestnut, the posterior green bands entirely vanishing. Even the characters drawn from the labial teeth are not constant in this perplexing species, these organs in some individuals being small and coadnate. One of our testaceous specimens has attained to the length of three and one-half inches.

*Hab.* Fort Riley, Kansas. Presented by Dr. Hammond.

*S. prasinipes*, nobis.

*S. obscuré nigro-viridis*, segmento cephalico cordato, basali magno; capite subtus rufo; pedibus, postremis exceptis, antennisque laeté prasinis; mandibulis rufis, dente magno; dentibus labialibus 6, intimis duobus utrinque latis, coadunatis, externo acuto, sejuncto; pedibus postremis, singula articulo basali rufo, multispinoso, processu angulari 4-5 spinis armato; appendicibus analibus lateralibus elongatis, singula 4-5 spinis. Long. unc. 10·25.

Dental plates small, quadrate, punctate. Suture between scuta and episcuta well marked. Distal extremity of the femoral joints of all the anterior legs with from three to four spines, of the metatarsæ with one. First joint of posterior pair of legs the longest, somewhat flattened above. Preanal scale quadrate, much narrowed posteriorly.

*Hab.* Island of Trinidad.

*S. epileptica*, nobis.

*S. rufo-castanea*, robusta, capite segmento basali maximo; dente mandibulari magno; dentibus labialibus 8, internis tribus utrinque valde coadunatis; antennis 17 articulatis, elongatis; scuta terminali media subcarinata; superficie ventrali laeté castanea; pedibus plerumque luteolis; postremis magnis, articulo basali spinis validis 20-25, processu angulari magno, multifido, multitudine tibialibus spinis 1-3; appendicibus analibus lateralibus minuté punctatis, singula spinis apicalibus 5-7; squama preanali elongata. Long. unc. 9.

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Prebasilar fold connate with basilar segment, the suture however well marked, existing as a deep groove. First segment of the body very much the smallest. Antennae generally yellowish, in some specimens chestnut. Scuta generally much widened posteriorly, their lateral margins arcuate and furnished with an elevated crest. Posterior margin of terminal scuta very strongly arcuate, the lateral borders, however, almost straight. Suture between scuta and episcuta traceable in most of the segments. Distal extremities—of femora of all the anterior legs armed, each, with a tubercle bearing from two to four small spines—of tibiae with a single minute spine—of metatarsae, with a longer but very slender one; claw large, furnished with two spines at its base. Femoral joints of last pair of legs longer than tibial, somewhat flattened above, each armed—on superior surface with six spines, forming two triangles—on internal margin and surface with from ten to twelve,—on inferior surface with from four to six.

*Hab.* Unknown.

*S. limicolor*, nobis.

*S. diluté castanea*, antennis 18 articulatis; dente mandibulari amplo, gracile; dentibus labialibus 10, intimis utrinque quatuor valde coadunatis, extimo sejuncto, acuto; pedibus postremis gracilibus, basali articulo utrinque bispinoso, processu angulari bifido; appendicibus analibus lateralibus punctatis, spina terminali simplice. Long. unc. 4.5.

Prebasilar fold absent: basilar segment large. Color of belly and feet very similar to that of the back, perhaps a little lighter. Preanal scale much narrowed posteriorly, short. Sutures between scuta and episcuta, and between sternum and episternum, well marked.

*Hab.* Bengal.

*S. gracilipes*, nobis.

*S. brunnea*, segmento cephalico parvo, prebasali nullo, basali maximo; antennis 20 articulatis; dente mandibulari et tuberculo basali magnis, dentibus labialibus 8, parvis, multo coadunatis; pedibus postremis gracilibus, articulo basali 7 spinulis in serie duplici dispositis; appendicibus analibus lateralibus elongatis, punctatis, singula 3 spinulis armata; squama preanali posticé emarginata. Long. unc. 3.

Color brown, with a lighter narrow stripe along centre of dorsum. Posterior margin of sternal plates rounded. Terminal angular process of last pair of legs scarcely developed. Our specimen is probably a young animal.

*Hab.* Singapore. Presented by Sandwith Drinker.

*S. dinodon*, nobis.

*S. saturate brunnea*, segmento cephalico magno, prebasali nullo, basali magno; antennis 18 articulatis, pubescentibus; dente mandibulari maximo, dentibus labialibus 12, parvis, nigris; pedibus postremis, singula articulo basali intus spinis magnis 3-4, subtus 2, armato; processu angulari elongato, obscure trifido; appendicibus analibus lateralibus punctatis, spinis apicalibus utrinque 3, parvis. Long. unc. 5.

Last pair of legs, as well as mandibles, inclining to rufous; femoral joint a little longer than tibial, flattened above; terminal angular process terminating in a large spine with two very small ones at the base. Sterna marked on posterior border with three light colored dots, the middle one being generally much the most conspicuous. Preanal scale somewhat elongate, impressed with an obsolescent longitudinal sulcus.

*Hab.* Singapore. Presented by Sandwith Drinker.

*S. cephalica*, nobis.

*S. diluté castanea*, robusta, capite amplissimo; dente mandibulari magno, dentibus labialibus 10, nigris, tuberculis similibus, vix coadunatis; antennis 19 articulatis; segmentis alternis minoribus; pedum postremum basali articulo

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utrinque bispinoso, processu angulari simplice; appendicibus analibus laterali-  
bus punctatis, spinâ apicali interdum bifidâ. Long. unc. 4-5.

The first segment of each pair is the smaller, until we reach the fourth couple, where the order is reversed and so continues to the end. The scuta of the preterminal segment is remarkable for its size and has its posterior angles rounded. The suture between the scuta and episcuta is obsolete, that between the sternal and episternal plates very distinct.

*Hab.* West Coast of Africa. Presented by John Cassin.

? Var. *gracilis*.

*S. cephalicæ* similima, adhuc multo gracilior; cephalico segmento et dente mandibulari multo minoribus; segmentis alternis minus inequalibus; dentibus labialibus acutioribus. Long. unc. 5-75.

Having but a single individual of each of these forms we prefer to retain this as a variety, although it will perhaps be found to be a distinct species. The two specimens are very different in their general appearance, but agree remarkably in their minute characteristics.

*Hab.* With the last. Presented by John Cassin.

*S. parvidens*, nobis.

*S. olivaceo-viridis*; segmento cephalico, antennis pedibusque luteolis; segmento prebasali nullo, basali magno; dentibus 10, parvis; pedum postremum articulo basali spinis 4-6 armato, processu angulari elongato, bifido vel trifido; appendicibus analibus lateraliibus luteolis, punctatis, singula spinis apicalibus 2. Long. unc. 4.

Head darker than antennæ, feet, &c., mandibular tooth rather large. Ventral surface drab. Sutures between sternal and episternal plates distinct. Posterior margin of terminal scuta strongly arcuate. Femora of last pair of legs longer than tibiæ, superior surface flattened and in one of our specimens slightly grooved. Preanal scale, quadrate, slightly narrowed posteriorly, posterior margin rounded.

*Hab.* Ningpoo, China. Dr. D. B. B. McCartee.

*S. torquata*, nobis.

*S. dilute ochracea*, capite segmentisque postremis rufis; segmento prebasali nullo, basali maximo; antennis 17 articulatis, lætè luteis; dente mandibulari magno, dentibus labialibus 6, obtusis; segmentis posticè dilutè viride marginatis; superficie ventrali pedibusque anterioribus luteis; pedibus postremis gracilibus, castaneis, articulo femorali elongato, 30-40 spinulis nigris armato, processu angulari multifido. Long. unc. 4.

First segment of body much the smallest; color of back approaches somewhat to a faded chestnut, the posterior segments losing the green margin, but obtaining a much redder hue. Distal extremity of last pair of legs, tinged with olive green. Lateral anal appendages sub-quadrate, their posterior margin rather sharp and provided with a minute black spine, their terminal process provided with 7 similar ones. Suture between scuta and episcuta better marked than that between sternum and episternum. Our specimen is perhaps not an adult.

*Hab.* Sombrero Island.

*S. pella*, nobis.

*S. olivaceo-brunnea*, capite castaneo, segmento prebasali nullo, segmento basali maximo; antennis 20 articulatis; dente mandibulari magno; dentibus labialibus 10, nigris, tribus internis utrinque valdè coadunatis; pedum postremorum articulo basali et secundo marginibus elevatis; illo, margine interiore 4-5 spinis, superficie inferiore 8-9 spinis serie triplici dispositis, processu angulari trifido vel quadrifido; appendicibus analibus lateraliibus punctatis, singula, 4-5 spinis apicalibus. Long. unc. 3.

Dental lamina somewhat elongate. Basilar tubercle of mandibular tooth

often composed of an aggregation of minute tubercles. Basal joint of last pair of legs a little longer than tibial, the superior surface flattened, inferior convex, raised margin not so prominent as that of the tibia. Breadth of preanal scale rather great proportionably to its length.

*Hab.* Surinam. Dr. Calhoun.

*S. punctiscuta*, nobis.

*S. olivacea*, capite rufo-castaneo, segmentorum corporalium margine posteriore et pleurumque anteriore viridis; superficie ventrali castanea; antennis 17 articulatis; dentibus 8, parvis, nigris, intimis tribus utrinque valde coadunatis; pedibus antennisque flavescens; pedis postremis articulo basali supra bispinoso, intus sexspinoso, subtus septemspinoso, processu angulari trifido; tibiali articulo 5 spinis; appendicibus analibus lateralibus punctatis, elongatis, singula 3-4 spinis apicalibus et altero marginale armatis. Long. unc. 4.75.

Cephalic as well as large basilar segment punctate, impressed with sutures, between some of the plates, which are separate during embryonic life. Suture between scuta and episcuta, and in one or two instances between the two true scuta well marked. Scuta punctate and finely chased on posterior border. Distal extremities of metatarsæ of all anterior legs provided with a slender spine; claw armed with a small one near its base. Preanal scale quadrate, narrowed posteriorly.

*Hab.* Caraccas. W. G. Boulton, Esq.

*S. puncticeps*, nobis.

*S. brunneo-olivacea*; segmento basali maximo; antennis 17 articulatis; dente mandibulari magno, robusto; dentibus labialibus 6, validibus, intimis duobus utrinque coadunatis, extimo sejuncto; lamina dentalibus excavatis; pedibus postremis elongatis, articulo femorali spinis 15-20, processu angulari trifido, articulo tibiali spinulis 3-5; appendicibus analibus lateralibus saturate brunneis, singula spinis apicalibus 2-3 et interdum altero marginale. Long. unc. 4.5.

Cephalic segment punctate: prebasilar fold connate with basilar segment, the line of junction, however, indicated by a deep furrow in the latter. First segment the smallest, the third next. Suture between the scuta and episcuta, well marked in middle segments of the body. Distal extremities of the femoral joints of the nineteenth and twentieth pairs of legs provided with from two to four small spines.

*Hab.* Unknown.

*S. atra*, nobis.

*S. brunneo-atra*, segmento cephalico magno, prebasali nullo, basali maximo; dente mandibulari maximo; dentibus labialibus 12, conicis, vix coadunatis; pedibus postremis gracilibus, articulo femorali spinis 4-5 armato; appendicibus analibus lateralibus elongatis, singula spinis apicalibus 2. Long. unc. 4.75.

Color of whole animal brownish black with an almost metallic reflection on the back and a reddish tinge about the head. The scutal plate of preterminal segment is very large, equalling any other in size. Preanal scale impressed with a longitudinal sulcus, its posterior border greatly rounded.

*Hab.* Unknown.

*S. plumbeolatus*, nobis.

*S. olivaceo-brunnea*, segmento cephalico obscure castaneo, prebasali nullo, basali magno; dente mandibulari magno, gracile; dentibus labialibus 10, parvis, nigris; antennis 18 articulatis, sordide luteolis; lateribus plumbeis; pedibus postremis gracilibus, articulo femorali 5 spinis, processu angulari interdum bifido; appendicibus analibus lateralibus punctatis, spinis apicalibus utrinque duobus. Long. unc. 4.

First, third and fifth segments the smallest. Posterior margin of some of

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the scuta tinged with green. Suture between sternum and episternum well marked. Legs of anterior portion of body, a dirty light yellow, gradually darkening as they approach the anus.

*Hab.* St. Jago, Cape Verde Islands. Dr. J. M. Somerville.

*S. testacea*, nobis.

*S. testacea*, segmento cephalico parvo, prebasali nullo, basali maximo; dentibus 6, intimis duobus utrinque latis coadunatis, externo sejuncto triangulari; antennis 17 articulatis; pedibus postremis robustis, basali articulo multipinoso; appendicibus analibus lateralibus, punctatis, rufis, singula 4-6 spinis apicalibus et altero marginale. Long. unc. 5.

First segment of body much the smallest. Femoral joint of posterior pair of legs flattened above; inner surface and margin with from fifteen to twenty small black spines; inferior surface with from ten to fifteen; terminal angular process with from six to eight.

*Hab.* Unknown.

*S. porphyra tainia*, nobis.

*S. testacea*, capite antennisque rufis; segmentis, (postremo excepto,) antice et postice nigro-purpurea late marginata; pedibus luteolis; dente mandibulari magno, dentibus labialibus 10, nigris; antennis 20 articulatis; pedibus postremis robustis, basali articulo margine exteriore vix elevato, margine interiore spinulis 5, processu angulari elongato, trifido vel quadrifido, superficie inferiore spinulis 9 triplici serie dispositis; appendicibus analibus lateralibus alte punctatis, singula spinis apicalibus 4-5 et altero marginale armatis. Long. unc. 4.75.

The last dorsal plate has its lateral margins elevated and its posterior tinged with purple. The posterior border of the large basilar segment of the head has also a narrow band of purple. The broad bands which ornament the segments of the body extend down somewhat upon the sides; in the day time they have in some lights a slight greenish reflection. This species is allied to *S. tigrina* Newp.; but, besides the peculiar coloration, it differs in the following particulars: In the number both of joints of antennæ and of labial teeth, in the scarcely elevated margin of femoral joint of last pair of legs, in greater length of this joint compared with tibial, in two of the series of spines on inferior surface of the joint being parallel, in the robustness of posterior pair of legs, in greater number of apical spines to lateral anal appendages and other particulars. The antennæ appear to have been tipped with white.

*Hab.* India.

#### Observations on *Cottus Copei*, Abbott.

BY CHAS. C. ABBOTT.

Having received a living specimen of the above named species, I deem it necessary to make a re-diagnosis of the species, as the original specimen, having been an alcoholic one, and somewhat distorted, led to several errors, which it is important to correct.

This species is closely allied to *Cottus viscosus*, *Hald.* and *C. Franklinii*, *Agass.*, but differs essentially from the former in the facial outline, from the eye, making a much less abrupt curve; thus giving the snout greater attenuation. In the mouth being more deeply cleft, and much more obliquely. In the body being strictly cylindrical, and not subcylindrical. It differs from *C. Franklinii*, in the tips of the pectorals overreaching the anterior margin of the second dorsal. In the anterior margin of the first dorsal being farther distant from the extremity of the snout. In the body, as it differs from *viscosus*. The proper diagnosis will then be

*Cottus Copei*, *Abb.*—Corpore cylindrico. Extremitatibus pinuarum pectoralium porrectis ad anteriorem dorsalis secundæ marginem. Pinnis ventralibus sub pectorales et ante dorsalem anteriorem, insertis.

1861.]

Appendix to the "Monograph of the PHILYPNI," and description of the genus *LEMBUS* of Günther.

BY THEODORE GILL.

In the Proceedings of the Academy of Natural Sciences for April, 1860, (pages 120 to 126,) there has been given a monograph of the *Philypni*, of which two genera, represented by three species, were described. Some time after the publication of that memoir, the first volume of the "Catalogue of the Acanthopterygian Fishes" of the British Museum, was received. Dr. Albert Günther, the author, among the addenda of that volume, has described a new generic form founded on a species discovered by Mr. Fraser in the Andes of Ecuador; the new genus was named *Lembus*, and is said to be "a true representative in South America of the Perches of the Arctic regions." In its general appearance, it is stated to resemble *Lucioperca*, or some of the other elongate Perches.

A perusal of the generic and specific diagnoses of Dr. Günther has convinced us that there must be some error in the reference of his new form to the family of Percoids.

In the diagnosis of the genus, there is said to be *no lateral line*, and the first dorsal has seven *slender spines*.

In the specific description, the branchiostegal membrane is stated to be "*fixed to the isthmus, without touching that of the other side,*" and "the ventral is inserted exactly under the pectoral, and composed of one feeble spine and five rays, the *fourth of which is the longest, nearly reaching to the vent.*" "The pseudobranchiæ are absent." "The opercles are neither serrated nor armed."

As none of these characteristics are common to the true Percoids, great doubt may be entertained as to the propriety of referring a fish with such features to that family. And as in all of those same characters, it resembles the Gobioids, and especially the Eleotroid genera, we entertain little or no doubt that it is really a member of the same family.

One of Günther's generic characters is the presence of a "band of villiform teeth on the jaws and on the vomer." There are six branchiostegals. The genus, therefore, belongs to the group of *Philypni*.\*

The scales are described as "*rather small, ctenoid, pentangular, with the basal margin vertical.*" This form of the scales is a common feature of the Gobioids with ctenoid scales, and although only the descriptive phrase "ctenoid" is applied, it is not too much to infer that, like its 'allies, *Lembus* has the scales simply pectinated on their posterior margins. The form of the body is described as resembling that of *Lucioperca*; *Lembus* is consequently on account of the size and pectination of the scales, and the general form of the body, more nearly allied to *Philypnus* as restricted by us than to *Bostrichthys*. The true generic characters, so far as can be gathered from the description, appear to be the following:

*LEMBUS* Günther.

*Synonymy.*

*Lembus Günther*, "Catalogue of the Acanthopterygian Fish," &c., vol. i. p. 505, 1860.

Head elongated, above depressed, and flat between the eyes. Mouth large, the supramaxillary bones extending to or beyond the vertical of the anterior border of the eye; lower jaw projecting beyond the upper; nostrils distant;

\*The pseudobranchiæ are absent, so far as yet known, only in the genera *Cnidon* of Muller and Troschel, and *Lates* of Cuvier among the Percoids. The preoperculum is sometimes entire in some of the Percoid genera, but the operculum has always one or more spines. The Etheostomoids have the inner rays of the ventrals longer than the external, but they are much more nearly related to Gobioids than to Percoids.

the posterior is near the upper angle of the orbit; the anterior is minute, and close to the upper extremity of the maxillary bone. Eyes of moderate size. Branchial apertures lateral. Scales ctenoid, at least on the trunk; small scales extending over the entire head, except the snout. Anterior dorsal fin with seven rays.

From the above description, it is evident that the genus is very nearly allied to *Philypnus*, and may perhaps be even identical with it. It probably, however, differs by having the branchial apertures more restricted and not extending so far forwards; by the more distant nostrils, which are not described as having raised margins, and possibly the smaller size of the scales on the head. The anterior dorsal has also seven rays, while *Philypnus* has only six, in common with most of the Gobioids. But all of these distinctions remain to be verified, and it is hoped that the author will give the true characters in that volume of his work in which the Gobioids will be described.

Although Dr. Günther appears to have been undoubtedly mistaken as to the affinities of his genus *Lembus*, the excellence and appropriateness of his description have left us in no doubt as to its true relations. The genital papilla is not mentioned as being present, but it was undoubtedly overlooked.

A single species of *Lembus* is known.

#### LEMBUS MACULATUS Günther.

##### *Synonymy.*

*Lembus maculatus* Günther, Catalogue of the Acanthopterygian Fishes, &c., vol. i. p. 505.

The species is thus characterized by Günther:

"Yellowish, irregularly spotted with blackish, back with five dark cross-bars; a black blotch behind the extremity of the operculum; three blackish streaks radiating from the eye, the vertical fins dotted with blackish."

There are fifty-seven scales in a longitudinal line, and twenty-two (?) in a transverse line.

The radial formula is B. 6. D. vii. I. 9, A. ii. 9.

There are now known, if *Lembus* is really distinct from *Philypnus*, three genera of the Philypnoid group.

#### I. PHILYPNUS Val.

Represented by species dwelling in the seas, on the eastern and western sides of tropical America, and ascending the fresh water streams.

#### II. LEMBUS Günther.

With one species inhabiting the mountain streams of Ecuador.

#### III. BOSTRICHTHYS (Dum.) Gill.

Peculiar to the temperate and tropical waters of eastern and southern Asia.

NOTE. In the Proceedings of the Zoological Society for January to June, 1860 page 236, which we have only now seen, Dr. Günther has remarked that his *Lembus maculatus* has "a prominent papilla near the vent, and is nearly allied to *Philypnus*." We take much pleasure in recording Dr. Günther's own correction of his error. It is at the same time due to ourselves to remark that we had shortly after the reception of the "Catalogue of the Acanthopterygian Fish," alluded to, in letters to two ichthyological friends, the affinity of *Lembus* and *Philypnus*, and that we had at nearly the same time in conversation with several others, expressed the same opinion. We allow the remarks and descriptions to stand that we then composed.

## Synopsis of American Cretaceous Brachiopoda.

BY W. M. GABB.

The paucity of species of this order in the cretaceous formation of North America is worthy of note. Among nearly a thousand species of mollusca, not a dozen, in all, have as yet been discovered and characterized. This arises doubtless from the fact that the only beds of the formation, yet demonstrated on this continent, belong to the higher members. The upper chalk comprises all the strata east of the Mississippi, and *may* include all west of that stream, although paleontological evidence seems to indicate the existence of the lower chalk, in the strata designated as Nos. 1 and 2 of Meek and Hayden's section in Nebraska, as well as part, if not all, of No. 3 of the same authors. The same deposits appear to exist in Texas, and may be found to cover a large extent of the yet unexplored regions of the West. Two or three upper greensand fossils have been mentioned as occurring in Texas, but as far as my opportunities of comparison have gone, I am satisfied that they are distinct. This is the case with the two species referred by Dr. Rømer, in his "Kreidebildungen von Texas," to *Pecten virgatus*, Nils., and *Trigonia crenulata*, Lam.

## TEREBRATULA, Lam.

*T. Harlani*, Morton. Silliman's Journal, v. 18, pl. 3, f. 16.

*T. perovalis*, M., *not Sow.* Jour. Acad. Nat. Sci., i. ser., v. 6, pl. 3.

*T. camilla*, M. Syn. 70.

*T. Harlani*, M. Syn. 70, pl. 3, f. 1, and pl. 9, f. 8, 9.

*T. fragilis*, Morton, *not Schlot.* Jour. Acad. Nat. Sci., v. 6, p. 75, pl. 3, f. 3, 4.

*T. Atlantica*, M. Jour. Acad. Nat. Sci., i. s., v. 8, p. 214.

*T. subfragilis*, d'Orb. Prod. Pal. v. 2, p. 258.

This species appears to be rather common in New Jersey. I have seen a deposit in the marl pits of Hon. Nathan Stratton, near Mullica Hill, N. J., almost entirely made up of the broken shells. In other places they are generally found whole. They vary very much in form. Sometimes the sides are as straight as the figure given in the Journal of the Academy, 1st ser., v. 6, pl. 3, f. 1; while other specimens are much more orbicular than the figures of the form referred by Dr. Morton to *T. perovalis* of Sowerby, and afterwards called *T. camilla*. The convexity of the valves varies, although generally the wider the shell, the flatter is the surface of the valves. Sometimes again, they show no traces of plications, and at others they are strongly plicate. I have made a careful comparison of nearly a hundred specimens of this and the form called *T. fragilis* by Dr. Morton, and I am compelled to believe, against my preconceived ideas to the contrary, that they are only wide varieties of the same species. True, there is no difficulty in separating the typical forms of the two, so-called, species; but, after so disposing of two-thirds of the specimens, I found some of the same size and shape as *fragilis* with no plications, except the faint ridges of the typical form of *Harlani*, while others, having all the other characters of *T. Harlani*, have plications nearly as deep as Dr. Morton's type of *T. fragilis*. The specimens of the latter form are not so common as the other. M. d'Orbigny, in *Prodrome de Pal. Strat.*, proposes the name *subfragilis* in place of *fragilis*, which was pre-occupied by Schlotheim. I have never seen this species, except from New Jersey and Delaware.

*T. Wacoensis*, Røem. Kreid. Tex., p. 81, pl. 6, fig. 2.

Appears to be common in Texas.

*T. Leonensis*, Con. Emory's Report, v. 1, p. 164, pl. 21, f. 2.

Very closely related to *Wacoensis*, but appears to be longer and more narrowed anteriorly. I am only acquainted with this species by means of the description and figure quoted above.

*Locality.* Texas.

*T. Choctawensis*, Shumard. Marcy's Report, p. 195, pl. 2, f. 3.

From the description given of this species, it would appear to be distinct from *T. Wacoensis*, but I have specimens in my collection intermediate in form between the two. The figure given is almost useless for the purpose of identification, but seems to me to be nothing but a young specimen of Rømer's species, a little more gibbous than usual. The slight difference of outline is not of enough importance to warrant their separation.

*T. Guadalupæ*, Røem. Kreide. von Texas, p. 82, pl. 6, f. 3.

Resembles a *terebratulina*, especially in the hinge margin of the ventral valve; but if the figure is correct, in regard to the form of the area of the dorsal valve, it is a true *Terebratula*.

#### TEREBRATELLA, d'Orb.

*T. plicata*, d'Orb. Prod. Pal., v. 2, p. 259.

*T. Sayi*, Gabb, 1859. Cat. Cret., p. 17, Proc. Acad. Nat. Sci. 1859.

*Terebratula plicata*, Say. Silliman's Jour. v. 2, p. 43.

*Terebratula Sayi*, Morton. Synopsis, p. 71, pl. 3, f. 3, 4.

Common in New Jersey.

*T. Vanuxemiana*, d'Orb. Prod. Pal., v. 2, p. 259.

*Terebratula*, *id.*, Lyell and Forbes. Quart. Jour. Geol. Soc., London, v. 1, p. 62.

Resembles the preceding species, but is undoubtedly distinct. It is found in New Jersey, but is rare.

#### TEREBRATULINA, d'Orb.

*T. Floridina*, d'Orb. Prod. Pal., v. 2, p. 258.

*Terebratula*, *id.*, Morton. Synopsis, p. 72, pl. 16, f. 7.

From the Cretaceous limestone of Alabama.

*T. lachryma*, d'Orb. Prod. Pal., 396.

*Terebratula*, *id.*, Morton. Synopsis, p. 72, pl. 10, f. 11, and pl. 16, f. 6.

Said by Dr. Morton to occur in South Carolina, and in Alabama, in beds since referred to the Eocene. M. d'Orbigny places it in the lower Eocene. This is incorrect, since I have it from the Cretaceous marls of New Jersey.

*T. Halliana*, n. s.

Suborbicular, flattened, most convex near the upper portion. The sides slope towards the beak for about a third of the length of the shell. The lower portion of the shell is rounded, presenting a very obscure angulation where the lateral margins unite with the basal; basal margin faintly sinuous. Lower valves regularly but moderately convex, with the sinus only visible on the lower fourth; foramen moderately large, area high. Upper valve convex for half its length, but in old specimens flat or concave for the remainder: hinge margin of the upper valve sloping distinctly from the beak, laterally. Surface marked by numerous rounded dichotomous ribs, crossed by very fine concentric lines.

This species differs from *T. lachryma* in form, so that a glance will serve to distinguish it. It resembles *T. Floridana* in shape, but the outline is somewhat more rounded than the specimen figured in "Synopsis." It differs, however, in having a more distinct sinus, in being less gibbous, and in the ribs being more prominent, larger and not so numerous. It gives me great pleasure to dedicate this beautiful species to the most able student of American Brachiopoda. Prof. Jas. Hall, of Albany, N. Y.

*Locality.* New Jersey.

The only species of the family *Lingulidæ* yet known, is

*Lingula subspatulata*, Hall and Meek, 1855. Mem. Am. Acad., Boston, 2 s., v. 5, p. 380, pl. 1.

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Pursuant to the By-Laws of the Academy, an election of the members of the Standing Committees for 1861 was held, with the following result :

*ETHNOLOGY.*

J. A. MEIGS,  
S. S. HALDEMAN,  
T. G. MORTON.

*BOTANY.*

E. DURAND,  
J. DARRACH,  
JOS. CARSON.

*COMP. ANAT. AND PHYSIOLOGY.*

JOS. LEIDY,  
JAS. M. CORSE,  
J. H. SLACK.

*GEOLOGY.*

ISAAC LEA,  
CHS. E. SMITH,  
J. P. LESLEY.

*MAMMALOLOGY.*

J. H. SLACK,  
JOHN CASSIN,  
J. L. LE CONTE.

*MINERALOLOGY.*

WM. S. VAUX,  
J. C. TRAUTWINE,  
T. D. RAND.

*ORNITHOLOGY.*

JOHN CASSIN,  
THOS. B. WILSON,  
S. W. WOODHOUSE.

*PALAEONTOLOGY.*

JOS. LEIDY,  
T. A. CONRAD,  
WM. M. GABB.

*HERPETOLOGY & ICHTHYOLOGY.*

R. BRIDGES,  
J. CHESTON MORRIS,  
J. L. LE CONTE.

*PHYSICS.*

B. HOWARD RAND,  
WM. M. UHLER,  
JAMES C. BOOTH.

*CONCHOLOGY.*

T. A. CONRAD,  
W. G. BINNEY,  
C. J. CLEBORNE.

*LIBRARY.*

WM. S. VAUX,  
JOS. LEIDY,  
J. D. SERGEANT.

*ENTOMOLOGY AND CRUSTACEA.*

ROBERT BRIDGES,  
J. L. LE CONTE,  
E. T. CRESSON.

*PROCEEDINGS.*

J. L. LE CONTE,  
JOS. LEIDY,  
WM. S. VAUX,  
JAS. C. FISHER,  
THOS. STEWARDSON.



February 5th.

Mr. LEA, President, in the Chair.

Thirty-one members present.

The following papers were presented for publication :

“Synonymy of the Cyclades, &c. No. 2. By Temple Prime.”

“Synopsis of the Subfamily Clupinæ, with descriptions of new genera, by Theodore Gill.”

“Descriptions of twenty-five new species of Unionidæ from Georgia, Alabama, Mississippi, Tennessee and Florida, by Isaac Lea.”

And were referred to committees.

February 12th.

Mr. LEA, President, in the Chair.

Forty-five members present.

The following papers were presented for publication :

“Descriptions of new recent shells from the coast of South Carolina, by Edmund Ravenel.”

“Synopsis of the Subfamily Pereinæ, by Theodore Gill.”

“Synopsis generum Rhyptiei et affinium, by Theodore Gill.”

“Description of a new species of Neritina, from Coosa river, Alabama, by Isaac Lea.”

“Descriptions of two new species of Anodonta, from Arctic America, by Isaac Lea.”

And were referred to committees.

Dr. LeConte stated in regard to the species of Anableps, described in the Proceedings of last month, by Mr. Gill, as *A. Dowii*, that he had seen it in great abundance, not only in the bay of La Union, San Salvador, but in all the streams emptying into the Gulf of Fonseca, and also in the small tributaries of the Rio Lempa, as far as the town of Virtud, a great distance from the ocean. The method of swimming is very peculiar; the fishes are seen in groups on the surface of the water, with their eyes projecting; they are easily alarmed, and very active. They are known to the natives under the name *cuatro-ojos*, in allusion to the transverse black band which divides the iris.

Mr. Gabb remarked that he had recently had an opportunity of conversing with Messrs. Meek and Hayden in regard to the Geological formations of the far West, and of examining the fossils brought by the numerous Government expeditions from that region. He said, “I have seen both the *Gryphæa calceola* and the *Ostrea Marshii*,” referred to by Prof. Marcou, in his letter, read to the Academy on December 11th, of last year.

“Prof. Marcou was laboring under a false impression in regard to those species, and thus misled me. The form referred to by Messrs. Meek and Englemann as *G. calceola*, is that figured by Quenstedt on pl. 48, figs. 2, 3 and 4, and called by Rømer *Ostrea calceola*. The form illustrated by fig. 1 of the same plate has never been found. It is even doubtful whether the Western  
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fossil is at all identical with the European species; but it is not sufficiently distinct to warrant a separation with the amount of material collected.

There can be no doubt, however, that this species (even were it found in the same beds with "*G. Tucumcarii*"), is certainly distinct from that species. The principal points of difference are—*G. calceola* (?) is a short abrupt oyster, with a large surface of attachment, and in every instance yet known with the beak totally obliterated. It is found in a bed not only with very different lithological characters, but belonging to a different horizon from those containing the *G. Pitcheri*.

The "plicated oyster, closely allied to *O. Marshii*," is in several important points very distinct from that species. It has been called by Mr. Meek *O. Englemanni*. It is of the type of *O. Marshii*, has strong plications, but differs mainly in the area. I have examined twenty or thirty specimens, and compared them with all the figures of the European species to which I have had access. The area of *O. Marshii* is at least four times as long as that of *O. Englemanni*. There are other characters also which would serve to distinguish them; as yet, the true *O. Marshii* has never been found in America.

Through the kindness of my friend, Dr. Janeway, I have obtained some specimens of *Gryphæa Pitcheri*, from the Indian Territory, near the Choctaw mission, and I believe I now have the means of proving the identity of the true *G. Pitcheri* with the form called by Prof. Marcou, *G. dilatata*, var. *Tucumcarii*.

With the aid of Prof. Marcou's figures, 1 to 3, pl. 4, on one hand, and Dr. Morton's types on the other, I have an unbroken series of gradation from one form to the other. I have exhibited the suite to a number of the best naturalists in Philadelphia, and no one has been able to show a break in the series. Mr. Conrad, after a careful examination, pronounced them to be a regular gradation from one variety to another of the same species.

Dr. Morton's original specimens, now lying on the table, as well as the last sentence of his descriptions, show that the beak is "distinctly incurved." Prof. Marcou refers a form to this species in which the beak is strongly deflected. This form, unknown to Dr. Morton, is, I have no doubt, distinct. I have recently gone over the whole subject carefully, with the following results: The oblique, carinated form is a distinct species, and must be called *Gryphæa navis*. The species described by Morton is the same as the one called *Tucumcarii* by Marcou. The small specimen figured by Morton is said by Marcou to be "incomplete and without the superior valve." This is not so. The specimen is a young one, but is very perfect. Dr. Rømer did not see it, because it was lost some time before his visit to Philadelphia, and afterwards discovered by me among some rubbish. The beak and umbone are round, there is no carination, and the figure in the Synopsis will convey a very correct idea of its form. It is as distinctly lobed as the figure 1, pl. 4, of Geology of N. A.

The large specimen, spoken of by Dr. Morton, from the plains of Kiamesha, is more nearly of the form of figure 3 of the same plate. There is every form between the two varieties, viz.: the one figured by Morton in his Synopsis, pl. 15, fig. 9, and the pl. 4, figs. 1 and 2.

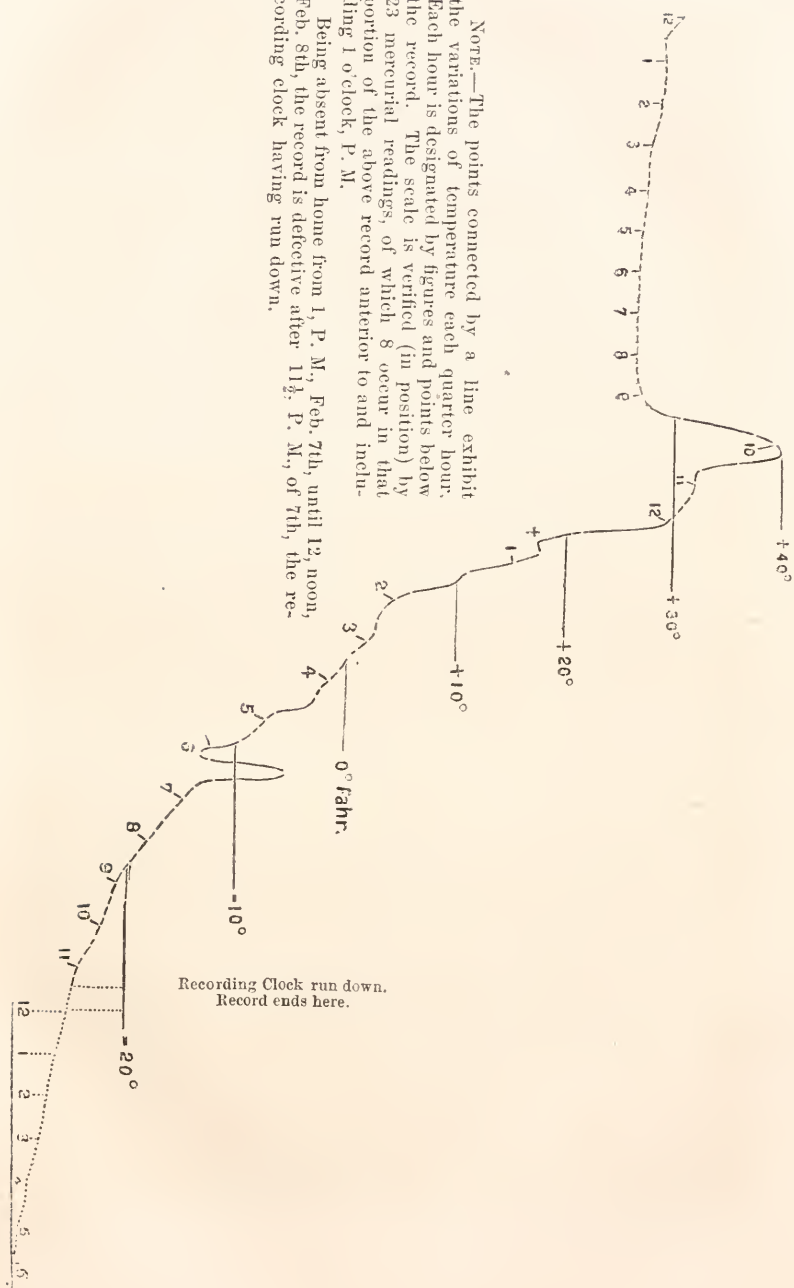
I do not wonder that Prof. Marcou should have maintained the difference between *G. Pitcheri* and *G. Tucumcarii* as he understood them, but the key to the difficulty is this: *G. Tucumcarii* is the typical form of *G. Pitcheri*, while *G. Pitcheri*, Marcou, is *G. navis*. This can be proven to any person who will take the trouble of investigating the subject."

Mr. Lea read a portion of a letter from Dr. Lewis, of Mohawk, New York, giving an account of a very sudden and remarkable fall of temperature experienced at that place, on the 7th of February last. The diagram exhibited was an exact copy of the one made at the time, by the self-registering thermometer devised by Dr. Lewis, and to which the attention of the Academy had been called by Mr. Lea at a previous meeting.

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NOTE.—The points connected by a line exhibit the variations of temperature each quarter hour. Each hour is designated by figures and points below the record. The scale is verified (in position) by 23 mercurial readings, of which 8 occur in that portion of the above record anterior to and including 1 o'clock, P. M.

Being absent from home from 1, P. M., Feb. 7th, until 12, noon, Feb. 8th, the record is defective after 11½ P. M., of 7th, the recording clock having run down.



The direction of the wind had been noted during the time of observation, as follows :

Wind east until 9, A. M. From 9, A. M., until 10 $\frac{1}{4}$ , A. M., wind S. W. with a little rain. From 10 $\frac{1}{4}$  violent west wind with snow. The clouds gathered like a summer thunder storm. I thought I discovered a faint flash of lightning about 12. Mrs. L. reports to me, that between 6 and 7, P. M., there was a partial remission of the storm. This may account for the sudden elevation of temperature that appears on the record at that time. The greatest violence of the storm was after this time, gradually declining after 11 or 12 o'clock. The snow accompanying this storm was in very fine particles. Probable range of temperature from 10, A. M., 7th Feb., until 8, A. M., 8th Feb., about 70°. Feb. 11th, at 2 $\frac{1}{2}$ , P. M., temperature 52° !!

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*February 19th.*

Mr. LEA, President, in the Chair.

Thirty-five members present.

A paper was presented\* for publication, entitled  
 "Descriptions of new species of Anodonta and Lithasia, by Isaac Lea," which was referred to a committee."

Dr. Slack called the attention of the members to some specimens of mammalia upon the table, viz. :

*Anomalurus Beechcroftii* (Fraser, P. Z. S.,) 1852, page 11, t. This genus resembles somewhat the American flying squirrel, (*Pteromys*,) but differs in having the greater portion of the tail covered with very short hairs, terminating in a tuft. On the inferior surface of the basal portion are a number of sharp, short spines, projecting downward. These are used by the animal in climbing, somewhat in the manner of climbing irons. This specimen is from Western Africa, collected by Duchailu.

*Belideus flaviventer* (*Waterhouse*, Marsupialia, p. 286.) A fine mounted specimen of this species, the Hepoonsa Roo of the colonists, was exhibited, and the distinction pointed out between the genera *Belideus* and *Acrobates*. This specimen was procured by Dr. Slack of a dealer in Edinburgh, and was said to have been received from New South Wales.

A fine series of the *Aluatta caraya Slack*, (*Simia caraya* Humb., *Mycetes niger* Wied.) Dr. S. stated that the name of *Mycetes* (*Illiger*, Prodrromus, 1811.) should be replaced by that of *Aluatta*, proposed by Lapepède in his *Tableaux de Classification*, 1799. The series consisted of five specimens, an adult male, entirely black; a very young male and adult female of a golden yellow color; and two nearly adult males, yellow, dashed with black. Two of the specimens were in the collection of the Academy, the others were collected during the recent Paraguay expedition, and are the property of the Smithsonian Institution.

Among the mammals presented by the Smithsonian Institution this evening, he particularized a female of the *Caprovis canadensis Gray*, (*Ovis canadensis* Shaw, Nat. Misc., xv., 1790, (*Ovis montana* Ord. Journ. A. N. S., vol. i. page 8, 1817,) and a very large specimen of the *Castor canadensis Kuhl.*, measuring three feet five inches from extremity of snout to end of tail.

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*February 26th.*

MR. LEA, President, in the Chair.

Thirty-three members present.

On report of the respective committees, the following were ordered to be printed in the Proceedings :

[Feb.

## Synonymy of the Cyclades, a family of Acephalous Mollusca. Part 2.

BY TEMPLE PRIME.

*Species.*

## GALATEA, Brug.

1. *G. Aegyptica*, Fischer. Il. Conch. v. 342. 1856. Bernardi Monog. 39, pl. vi., f. 1, 2. 1860.  
*Venus Aegyptica*, Chemn. xi. 231, f. 1985, 1986.  
*Galatea Chemnitzii*, Phil. Abb. 124. 1851.  
 Hab. Egypt.
2. *G. G. Bengoensis*, Dkr. Ind. Guin. 51, pl. ix. f. 28, 30. Zeit. Malak. 183. 1848. Phil. Abb. 123. 1851. Bernardi Monog. 25, pl. vi. f. 5, 6., pl. ix. f. 4. 1860.  
 Hab. Africa.
3. *G. Bernardii*, Dkr. Il. Conch. 338, pl. xii. f. 3. 1857. Bernardi Monog. 32, pl. v. f. 1, 5. pl. viii. f. 8. 1860.  
 Hab. Guinea.
4. *G. Caillaudii*, Bernardi. Bern. Monog. 43, pl. iv. f. 1, 2. pl. ix. f. 3. 1860.  
 Hab. Africa.  
 —*G. Chemnitzii*, Phil. Phil. Abb. 124. 1851. Is *Gal. Aegyptica* Fischer.
5. *G. concamerata*, Duval. Rev. Zool. 211. 1840. Chenu. Ill. Conch. livr. 55. 2d pl. suppl. f. 3. Bernardi Monog. 20, pl. ii., f. 1. pl. iii., f. 1, 2, pl. viii. f. 1. 1860.  
 Hab. Africa.
6. *G. Cumingii*, Dkr. Bernardi Monog. 35, pl. vi. f. 7, 8. pl. ix. f. 8. 1860.  
 Hab. Gaboon.
7. *G. Heukelomii*, Bernardi. Bern. Monog. 30, pl. vi. f. 3, 4. pl. ix. f. 2. 1860.  
 Hab. Africa.
8. *G. Kochii*, Bernardi. Bern. Monog. 22, pl. iv. f. 3-8, pl. ix. f. 6, 7. 1860.  
 Hab. Central Africa.
9. *G. laeta*, Phil. Zeit. Malak. 190. 1848. Phil. Abb. 123, pl. 1, f. 2. 1851. Bernardi Monog. 27, pl. 1, f. 3-8. pl. viii. f. 7. 1860.  
 Hab. Guinea.
10. *G. Lubackii*, Bernardi. Bern. Monog. 24, pl. 1, f. 4, 6. pl. viii. f. 4. 1860.  
 Hab. Africa.  
 —*G. paradoxo*, Adams. Adams, Rec. Gen. 2, 408. 1858. Is *Gal. radiata*, Lam.  
 —*G. Philippiana*, Morelet. Mss. Is *Gal. laeta et rubiconda*.
11. *G. radiata*, Lamk. Ann. Mus. v. 430, f. 28. 1806. Bernardi Monog. 18, pl. vii. f. 1-5, pl. viii. f. 3. 1860.  
*Pectunculus subviridis, crassissimus, rostratus?* List. pl. 158, f. 13. 1770.

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- Venus paradoxa*, Born. Born. Mus. 66, pl. iv. f. 12, 13. 1780.  
*V. reclusa*, Chemn. vi. 326, pl. 31, f. 327-329. 1788.  
*V. meretrix*, var. Gml. 13 ed. 3273. No. 15. 1793.  
*V. hermaphrodita*, Gml. 13 ed. 3278. No. 40. 1793.  
*V. subviridis*, Gml. 13 ed. 3280. No. 55. 1793. Brug. Encycl. pl. 250. 1797.  
*Egeria radiata*, Roissy. Buffon, vi. 327, pl. 64, f. 5.  
*Douar variegata*, Perry. Conch. pl. 58, f. 1? 1811.  
*Tellina hermaphrodita*, Diller. Cat. 1, 107. 1817.  
*Trigona* (ex parte.) Schum. 153. 1817.  
*Cyclas hermaphrodita*, Mart. Mag. Nat. Hist. 1, 402, pl. 1, f. 1, 2.  
*Potamophila radiata*, Sowb. Gen. of Shells.  
*Megadesma radiata*, Bowd. Elem. Conch. 2d pt. 8, f. 21. 1822.  
*Cyclas radiata*, Schweig. Handbuch d. nat. 707.  
*Venus paradoxa*, Wood. Index, pl. vii. f. 48. 1828.  
*Galatea paradoxa*, Adams. Rec. Gen. 2, 408. 1858.

Hab. Africa.

12. *G. rubicunda*, Phil. Zeit. Malak. 190. 1848. Phil. Abb. 123, pl. 1, f. 2. 1852. Bernardi Monog. 37, pl. 1, f. 1, 2, pl. viii. f. 2. 1860.

*Galatea Phillipiana*, Morelet. (pars.) Mss.

Hab. Guinea.

13. *G. tenuicula*, Phil. Zeit. Malak. 191. 1848. Phil. Abb. iii. 124, pl. 1, f. 3. 1851. Bernardi Monog. 41, pl. ii. f. 2; pl. viii. f. 5. 1860.

Hab. ?

- G. versicolor*, Morelet. Adams. Rec. Gen. 2, 408. 1858. Is *Gal. laeta et rubicunda*.

FISCHERIA,\* Bernardi. 1860.

1. *F. Delessertii*, Bernardi. Bernardi Monog. 46, pl. 3, f. 3, 4; pl. ix. f. 5. 1860.

Hab. Cape Palmas, Africa.

GLAUCONOME, Gray.

1. *Gl. angulata*, Reeve. Proc. Zool. xii. 20. 1844. Conch. Icon. pl. 1, f. vi.

Hab. Isl. of Negros.

- Gl. bipinnata*, Phil. Pal. Foss. pl. xi. f. 33. Is *Ichthyorachus bipinnata*, d'Orb.

2. *Gl. cerea*, Reeve. Proc. Zool. xii. 20. 1844. Conch. Icon. pl. 1, f. viii.

Hab. The Ganges.

3. *Gl. Chinensis*, Reeve. Conch. Icon. pl. 1, f. 1.

Hab. China.

4. *Gl. convexa*, Desh. Grat. Moll. terr. et fluv. Fr. 51. 1855.

Hab. France, (fossil.)

5. *Gl. corrugata*, Reeve. Proc. Zool. xii. 20. 1844. Conch. Icon. pl. 1, f. v.

Hab. Manilla.

6. *Gl. curta*, Reeve. Proc. Zool. xii. 20. 1844. Conch. Icon. pl. 1, f. 7.

Hab. Lucon.

- Gl. disticha*, Goldf. pl. 64, f. 15. 1830. Is *Penniretepora disticha*, d'Orb.

\*This genus having been instituted subsequently to the publication of the first part of this paper, did not appear in the list given of the genera belonging to this family.

- Gl. disticha*, Lonsdale. Murch. Silur. pl. xv. f. 12. 1839. Is *Penniretepora Lonsdalei*, d'Orb.
- Gl. gracilis*, McCoy. Syn. Irel. 199, pl. 28, f. v. 1844. Is *Penniretepora gracilis*, d'Orb.
- Gl. grandis*, McCoy. Loc. sub. cit. 199, pl. 28, f. 3. 1844. Is *Penniretepora grandis*, d'Orb.
- Gl. hexagona*, Münster. Goldf. Petr. Germ. 1, 100, pl. 36, f. 8. 1831. Is *Vincularia hexagona*, d'Orb.
- Gl. marginata*, Münster. Goldf. Petr. Germ. 1, 100, pl. 36, f. v. 1831. Is *Vincularia marginata*, d'Orb.
7. *Gl. plana*, Desh. Grat. Moll. terr. fluv. Fr. 51. 1855.  
Hab. France, (fossil.)
8. *Gl. psmatella*, Desh.  
*Glaucanomeya psmatella*, Desh. Adams. Rec. Gen. 2, 442. 1858.  
Hab?
- Gl. pulcherrima*, McCoy. Syn. Irel. 99, pl. 23, f. 4. 1844. Is *Plytopora pulcherrima*, d'Orb.
9. *Gl. radiata*, Reeve. Proc. Zool. xii. 20. 1844. Conch. Icon. pl. 1, f. 3.  
Hab. Zeeba.
- Gl. rhombifera*, Münster. Goldf. Petr. Germ. 1, 100, pl. 36, f. 6. 1831.  
Is *Vincularia rhombifera*, d'Orb.
10. *Gl. rostralis*, Desh.  
*Glaucanomya rostralis*, Desh. Adams. Rec. Gen. 2, 442. 1858.  
Hab?
11. *Gl. rugosa*, Reeve. Proc. Zool. xii. 19. 1844. Conch. Icon. pl. 1, f. 4.  
Hanley in Wood. Index, pl. x. f. 4.  
Hab. Manilla.
12. *Gl. straminea*, Reeve. Proc. Zool. xii. 20. 1844. Conch. Icon. pl. 1, f. 2.  
Hab. Manilla.
- Gl. tetragona*, Münster. Goldf. Petr. Germ. 1, 100, pl. 36, f. 7. 1831.  
Is *Vincularia fragilis*, DeFrance.
13. *Gl. virens?* Hanley. Proc. Zool. xii. 18. 1844.  
Hab. China.

## CYPRINA, Lamk.

- C. aequalis*, Phil. Sicil 1, 39. 1836. Is *Cyprina Islandica*, Lamk.
1. *C. affinis*, d'Orb. Prod. 1. 1850.  
*Venus affinis*, Münster. Goldf. Petr. Germ. 2, 244, pl. 150, f. xi. 1839.  
Hab. Germ., (fossil.)
2. *C. Alcyon*, d'Orb. Prod. 1. 1850.  
Hab. France, (fossil.)
3. *C. amphyrion*, d'Orb. Prod. 1. 1850.  
Hab. France, (fossil.)
4. *C. angulata*, Sowb. M. C. 1, 145, pl. 65. 1814.  
Hab. England, (fossil.)  
—*C. angulata*, Sowb. Trans. Geol. iv. 128. 1836. Is *Cyprina Sowerbyi*, d'Orb.
5. *C. Antiopa*, d'Orb. Prod. 1. 1850.  
Hab. France, (fossil.)

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6. *C. antiqua*, d'Orb. Prod. 1. 1850.  
*Venus antiqua*, Münster. Goldf. Petr. Germ. 2, 243, pl. 150, f. iv. 1839.  
 Hab. Germ., (fossil.)  
 —*C. Archiacina*, d'Orb. Prod. 2. 1850.  
*Crassatella quadrata*, d'Archiac. Mem. Soc. Geol. 2d ser. 2, 301, pl. xiv.  
 f. 1. 1847.  
 Hab. Belgium, (fossil.)  
 —*C. Arctica*, Turt. Brit. bivalves, 135. 1822. Is *Cyprina Islandica*.  
 Lamk.
7. *C. arenaria*, Meek & Hayden. Proc. Ac. N. S. Phil. ix. 143. 1857.  
 Hab. N. America, (fossil.)
8. *C. Arethusia*, d'Orb. Prod. 1. 1850.  
 Hab. France, (fossil.)
9. *C. Arion*, d'Orb. Prod. 1. 1850.  
 Hab. France, (fossil.)
10. *C. astartaeformis*, d'Orb. Prod. 1. 1850.  
*Isocardia astartaeformis*, Münst. Beitr. Petr. iv. 87, pl. viii. f. 24. 1841.  
 Hab. France, (fossil.)
11. *C. Bajocina*, d'Orb. Prod. 1. 1850.  
 Hab. France, (fossil.)
12. *C. Beaumontii*, d'Orb. Prod. 1. 1850.  
*Cardium Beaumontii*, d'Archiac. Mem. Soc. Geol. 373, pl. xxvi. f. 4.  
 1843.  
 Hab. France and England, (fossil.)
13. *C. Bernardina*, d'Orb. Prod. 2. 1850.  
 Hab. France, (fossil.)
14. *C. Bernensis*, Leymerie. 1842.  
*Cyprina rostrata*, d'Orb. (non Sowb.) Pal. Fr. cret. 3, 98, pl. 271. 1843.  
 Hab. France, (fossil.)
15. *C. Blandina*, d'Orb. Prod. 1. 1850.  
 Hab. France, (fossil.)
16. *C. Bonasia*, d'Orb. Prod. 1. 1850.  
 Hab. France, (fossil.)
17. *C. Bosquetiana*, d'Orb. Prod. 2. 1850.  
 Hab. Germ., (fossil.)
18. *C. Brönnii*, Desh.  
 Hab. Germ., (fossil.)
19. *C. Calliope*, d'Orb. Prod. 1. 1850.  
 Hab. France, (fossil.)
20. *C. Cancriniana*, d'Orb. Murch. Vern. et de Keys. Russia, 2, 457.  
 pl. 38, f. 26, 27. 1845.  
 Hab. Russia, (fossil.)
21. *C. carditaeformis*, d'Orb. Prod. 1. 1850.  
*Venus carditaeformis*, Roemer, Oolit. 109, pl. vii. f. 15. 1836.  
 Hab. Germ., (fossil.)
22. *C. carinata*, d'Orb. Prod. 1. 1850.  
*Venus carinata*, Roemer. Oolit. 110, pl. vii. f. 10. 1836.  
 Hab. Germ., (fossil.)
23. *C. Carteroni*, d'Orb. Prod. 2. 1850.  
 Hab. France, (fossil.)



- C. compressa*, Turt. Brit. bivalves, 136, pl. xi. f. 21–23. 1822. Is *Astarte compressa*, Mont.
24. *C. compressa*, Meek & Hayden. Proc. Ac. N. S. Phil. 144. 1857.  
Hab. N. America, (fossil.)
25. *C. Conradi*, d'Orb. Prod. 2. 1850.  
*Venilia Conradi*, Morton. Syn. Cret. pl. viii. f. 1, 2. 1834.  
*Cardita decisa*. Loc. sub. cit.. pl. ix. f. 3. 1834.  
Hab. N. America, (fossil.)
26. *C. consobrina*, d'Orb. Paleont. 3, 107, pl. 278, f. 3–6. 1843.  
Hab. France, (fossil.)
27. *C. Corallina*, d'Orb. Prod. 2. 1850.  
Hab. France, (fossil.)
28. *C. cordata*, Meek & Hayden. Proc. Ac. N. S. Phil. ix. 143. 1857.  
Hab. N. America, (fossil.)
29. *C. cordiformis*, d'Orb. Paleont. 3, 101, pl. 273. 1843.  
Hab. France, (fossil.)
30. *C. cornuta*, d'Orb. Prod. 2. 1850.  
*Isocardia cornuta*, Kläden. Pl. 3, f. 8. Roemer 38, pl. 19, f. 14. 1839.  
Hab?
31. *C. corrugata*, Lamk. Lamk. v. 1818.  
Hab? (fossil.)  
—*C. crassa*, Desh. Encycl. Méth. t. 11. 2d part, 47. 1830. Is *Corbicula crassa*, Desh.
32. *C. crassitesta*, Reüss.  
Hab. Germ., (fossil.)
33. *C. cuneata*, Sowb. Trans. Geol. Soc. iv. 240, pl. 16, f. 19. 1836.  
Hab. France and England, (fossil.)
34. *C. Cytherea*, d'Orb. Prod. 1. 1850.  
Hab. France, (fossil.)  
—*C. Defrancii*, Van Beneden. Is *Cyprina rustica*, Flem.  
—*C. deltoidea*, Phil. Pal. foss. pl. 17, f. 59. Is *Cardium dettoideum*, d'Orb.
35. *C. dimorpha*, d'Orb. Prod. 1. 1850.  
Hab. France, (fossil.)
36. *C. dolabra*, d'Orb. Prod. 1. 1850.  
Hab. England, (fossil.)
37. *C. donacina*, d'Orb. Prod. 1. 1850.  
*Venus donacina*, Schloth. Goldf. Petr. Germ. 2, 242, pl. 150, f. 3. 1839.  
Hab. Germ., (fossil.)  
—*C. Egertoni*, McCoy. Syn. Ireld. 55, pl. x. f. 9. 1844. Is *Cardimorpha Egertoni*, d'Orb.
38. *C. Elea*, d'Orb. Prod. 2. 1850.  
Hab. France, (fossil.)
39. *C. elongata*, d'Orb. Paleont. 3, 106, pl. 267, f. 816. 1843.  
Hab. France, (fossil.)
40. *C. Erato*, d'Orb. Prod. 2. 1850.  
Hab. France, (fossil.)
41. *C. Eucharis*, d'Orb. Prod. 2. 1850.  
Hab. France, (fossil.)

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42. *C. Eryvensis*, d'Orb. Paleont. 3, 102, pl. 274. 1843.  
Hab. France, (fossil.)
43. *C. Gea*, d'Orb. Prod. 2. 1850.  
Hab. France, (fossil.)  
—*C. gigas*, Lamk. Lamk. v. 1818. Is *Venus umbonaria*.
44. *C. globosa*, d'Orb. Prod. 1. 1850.  
*Cardium globosum*, Roemer. Oolit. 39, pl. 19, f. 19. 1836.  
*Venus tenuistria*, Münster. Petr. Germ. 1, 245, pl. 150, f. 18. 1839.  
Hab. Germ., (fossil.)  
—*C. globosa*, Sharpe. Journ. Geol. Soc. vi. pl. 15, f. 1. Is *Cyprina Sharpei*, Prime.
45. *C. Glycerie*, d'Orb. Prod. 2. 1850.  
Hab. France, (fossil.)
46. *C. Helmerseniana*, d'Orb. Murch. 2, 457, pl. 38, f. 28-30. 1845.  
Hab. France, (fossil.)
47. *C. Hersilia*, d'Orb. Prod. 2. 1850.  
Hab. France, (fossil.)
48. *C. humilis*, Meek & Hayden. Proc. Ac. N. S., Phil. 179. 1860.  
Hab. N. America, (fossil.)  
—*C. incrassata*, Nyst. Coq. Foss. Hasselt. 7. 1836. Is *Cytherea incrassata*, Sowb.
49. *C. inornata*, d'Orb. Paleont. 3, 99, pl. 272, f. 1, 2. 1843.  
Hab. France, (fossil.)
50. *C. intermedia*, d'Orb. Paleont. 3, 107, pl. 278, f. 1, 2. 1843.  
Hab. France, (fossil.)
51. *C. involuta*, d'Orb. Prod. 1. 1850.  
*Corbula involuta*, Münster. Goldf. Petr. Germ. 2, 250, pl. 151, f. 14. 1839.  
Hab. Germ., (fossil.)
52. *C. Islandica*, Lamk. Lamk. v. 1818.  
*Venus Islandica*, Linn. 1131. Müller, Verm. 246. 1774.  
*Pectunculus major*, da Costa. 183, pl. 14, f. 3. 1778.  
*Venus bucardium*, Born. Mus. 63, pl. 4, f. 11. 1780.  
*Artica vulgaris*, Schum. 145, pl. 13, f. 3. 1817.  
*Cyprina arctica*, Turt. Brit. bivalves, 135. 1822.  
*Venus aequalis*, Sowb. M. C. pl. xxi.  
*Cyprina aequalis*, Phil. Sieil. 1, 39. 1836.  
*C. maxima*, Wood. Ann. N. H. vi. 249.  
*C. angulata*, Sowb. Nyst. Foss. Anvers, 9.  
*C. Islandicoides*, Lamk. Loc. sub. cit. p. 9.  
*C. vulgaris*, Sowb. Gen. of Shells.  
Hab. Europe and America.  
—*C. Islandicoides*, Lamk. Lamk. v. 1818. Is *Venus Islandicoides*, Lamk.
53. *C. Jurensis*, Morris. Brit. fossils, 199. 1854.  
*Venus Jurensis*, Münster. Goldf. Petr. Germ. 2, p. 245, pl. 150, f. 17. 1839.  
Hab. England and Germany, (fossil.)
54. *C. Kharascovensis*, Rouillier. Bull. Soc. Moscou xx. 421, f. 32, 32. 1847.  
Hab. Russia, (fossil.)  
—*C. Lajonkairii*, Goldf. Petr. Germ. 237, pl. 148, f. 9. 1841. Is *Cyprina rustica*, Goldf.

55. *C. lata*, d'Orb. Prod. 2. 1850.  
*Venus lata*, Roemer. 27, pl. ix. f. 10. 1841.  
 Hab. Germ., (fossil.)
56. *C. laticostata*, d'Orb. Prod. 1. 1850.  
*Isocardia laticostata*, Münster. Beitr. iv. 87, pl. viii. f. 24. 1841.  
 Hab. Austria, (fossil.)
57. *C. Ligeriensis*, d'Orb. Paleont. 3, 103, pl. 275, f. 1-3, (exclus. f. 4, 5.) 1843.  
 Hab. France, (fossil.)
58. *C. lunulata*, Desh. Inv. Paris, 1, 546, pl. xxxv. f. 19-21. 1860.  
 Hab. France, (fossil.)  
 —*C. maxima*, Wood. Ann. N. H. vi. 249. Is *Cyprina Islandica*, Lamk.  
 —*C. minima*, Turt. Brit. bivalves, 137. 1822. Is *Circe minima*.
59. *C. Morrissii*, Sowb. Min. Conch. pl. 620.  
 Hab. England, (fossil.)
60. *C. nana*, Sowb. Dixon, Foss. Suss. pl. 14, f. 8.  
 Hab. England, (fossil.)
61. *C. neglecta*, d'Orb. Prod. 3. 1852.  
*Erycina neglecta*, Nyst. 89, pl. 3, f. 134. 1843.  
 Hab. Belgium, (fossil.)
62. *C. Neptuni*, d'Orb. Prod. 2. 1850.  
 Hab. France, (fossil.)
63. *C. nitida*, d'Orb. Prod. 1. 1850.  
*Isocardia nitida*, Phil. 122, pl. ix. f. 10. 1829.  
 Hab. England, (fossil.)
64. *C. Normaniana*, d'Orb. Prod. 1. 1850.  
 Hab. France, (fossil.)
65. *C. Noueliana*, d'Orb. Prod. 2. 1850.  
*Cyprina Ligeriensis*, d'Orb. (pars.) Paleont. 3, 103, pl. 275. f. 4. 5.  
 (exclus. 1-3.) 1843.  
 Hab. France, (fossil.)
66. *C. nuda*, d'Orb. Prod. 1. 1850.  
*Venus nuda*, Goldf. Zieten. 94, pl. 71, f. 3. 1830.  
 Hab. Germ., (fossil.)
67. *C. Nystii*, Hebert. 1849.  
*Cyprina scutellaria*, Nyst. (non Desh.) 145, pl. 7, f. v; pl. 8, f. 1. 1843.  
 Hab. Belgium, (fossil.)  
 —*C. obliqua*, d'Orb. Prod. 2. 1850. Is *Corbicula obliqua*, Desh.
68. *C. obliquissima*, d'Orb. Prod. 1. 1850.  
 Hab. France, (fossil.)
69. *C. oblonga*, d'Orb. Paleont. 3, 105, pl. 277, f. 1-4. 1843.  
*Astarte cyprinoides*, d'Archiac. Tourtia pl. xiv. f. 5. 1847.  
 Hab. France and Belgium, (fossil.)  
 —*C. oblonga*, Reuss. p. 4, pl. 15. 1846. Is *Crassatella oblonga*, d'Orb.
70. *C. orbicularis*, Roem. Nord D. Kreide, 73, pl. ix. f. 8. 1841.  
 Hab. France and Germany, (fossil.)  
 —*C. orbiculata*, Turton. Brit. bivalves, 138. 1822. Is *Lucina orbicularis*, Mont.

71. *C. ovata*, Meek & Hayden. Proc. Ac. N. S., Phil. ix. 144. 1857.  
Hab. N. America, (fossil.)
72. *C. parvula*, d'Orb. Prod. 2. 1850.  
*Venus parvula*, Roemer. Oolith. iii. pl. vii. f. 13. 1836.  
Hab. Germ., (fossil.)  
—*C. Pedemontana*, Lamk. Lamk. v. 1818. Is *Venus Pedemontana*.
73. *C. Phillipsii*, d'Orb. Prod. 1. 1850.  
*Isocardia angulata*, Phillips. Yorksh. 122, pl. ix. f. 9. 1829.  
Hab. England, (fossil.)
74. *C. piatigorskensis*, Fischer. Bull. Soc. Moscou, xxi. 1848.  
Hab. Russia, (fossil.)  
—*C. pisum*, d'Orb. Prod. 2. 1850. Is *Corbicula pisum*, Desh.
75. *C. plana*, d'Orb. Prod. 1. 1850.  
*Isocardia plana*, Münster. Petref. iv. 87, pl. viii. f. 23. 1841.  
Hab. Germany, (fossil.)  
—*C. planata*, Sowb. M. C. pl. 619. Is *Cyprina scutellaria*, Desh.
76. *C. Provencialis*, d'Orb. Prod. 2. 1850.  
Hab. France, (fossil.)
77. *C. quadrata*, d'Orb. Paleont. 3, 105, pl. 276. 1843.  
Hab. France, (fossil.)
78. *C. regularis*, d'Orb. Loc. sub. cit. 3, 100, pl. 272, f. 3-6. 1843.  
Hab. France, (fossil.)
79. *C. Roemeri*, d'Orb. Prod. 1. 1850.  
*Lucina globosa*, Roemer. Oolit. 41, pl. 19, f. 6. 1831.  
Hab. Germ., (fossil.)
80. *C. rostrata*, Sowb. Geol. Trans. iv. 240, pl. 17, f. 1. 1836.  
Hab. England, (fossil.)  
—*C. rostrata*, d'Orb. Pal. 3, 98, pl. 271. 1843. Is *Cyprina Bernensis*, Leym.
81. *C. rotundata*, Braün. Agas. Icon. coq. test. 53, pl. 14. 1845.  
Hab. Germ., (fossil.)
82. *C. Royana*, d'Orb. Prod. 2. 1850.  
Hab. France, (fossil.)
83. *C. rustica*, Morris. Brit. Foss. 199. 1854.  
*Venus rustica*, Sowb. Mur. Conch. pl. 196.  
*Cyprina Lajonkairii*, Goldf. Petr. Germ. 237, pl. 148, f. 9. 1841.  
*C. tumida*, Nyst. Tert. Belg. 148, pl. x. f. 1. 1835, 1843.  
*C. Defrancii*, Van Beneden.  
Hab. England, Belgium and Germany, (fossil.)
84. *C. scutellaria*, Desh. Coq. foss. 1, 125, pl. xx. f. 1-3. 1824.  
*Cytheria scutellaria*, Defr. Dict. Scie. Nat. t. xii. 421. 1818.  
*Cyprina planata*, Sowb. M. C. pl. 619.  
Hab. France and England, (fossil.)  
—*C. scutellaria*, Nyst. 145, pl. vii. f. 5, pl. viii. f. 1. 1843. Is *Cyprina Nystii*. Heberl.
85. *C. Sharpei*, Prime.  
*Cyprina globosa*, (preoc.) Sharpe. Journ. Geol. Soc. vi. pl. 15, f. 1.  
Hab. England, (fossil.)

86. *C. Sowerbyi*, d'Orb. Prod. 2. 1850.  
*Cyprina angulata*, Sowb. Trans. Geol. Soc. iv. 128. 1839. (non. Sowb. M. C.)  
 Hab. England, (fossil.)
87. *C. strigillata*, d'Orb. Prod. 1. 1850.  
*Cardia strigillata*, Klippstein. Beitr. Geol. 255, pl. xvi. f. 23. 1845.  
 Hab. Germany, (fossil.)
88. *C. subangulata*, d'Orb. Prod. 1. 1850.  
*Venus angulata*, Münster. Goldf. Petr. Germ. 2, 243, pl. 150, f. v. 1839.  
 Hab. Germany, (fossil.)
89. *C. subcordiformis*, d'Orb. Prod. 1. 1850.  
 Hab. France, (fossil.)
90. *C. subobliqua*, d'Orb. Prod. 1. 1850.  
*Venus obliqua*, Münster. Goldf. Petr. Germ. 2, 243, pl. 150, f. 6, 1839.  
 Hab. Germ., (fossil.)
91. *C. subrostrata*, Münster. Beitr. iv. 87, pl. viii. f. 26, 1841.  
 Hab. Germ., (fossil.)
92. *C. subtumida*, Meek & Hayden. Proc. Ac. N. S. Phil. ix. 144. 1857.  
 Hab. N. America, (fossil.)  
 —*C. tenuistria*, Lamk. Lamk. v. 1848. Is *Venus Chinensis*, Chemn.
93. *C. trapeziformis*, d'Orb. Prod. 1. 1850.  
*Venus trapeziformis*, Roemer. Oolit. 109, pl. vii. f. 14. 1836.  
 Hab. Germany, (fossil.)  
 —*C. triangularis*, Turt. Brit. bivalves, 136, pl. xi. f. 19, 20. 1822.  
 Is *Circe minima*.  
 —*C. tridacnoides*, Lamk. Lamk. v. 1818. Is *Venus deformis*, Say.  
 —*C. trigona*, d'Orb. Prod. 2. 1850. Is *Corbicula triangula*, Prine.  
 —*C. tumida*, Nyst. Coq. Tert. Belg. 148, pl. x, f. 1. 1835-1843. Is *Cyprina rustica*, Fleming.  
 —*C. umbonaria*, Lamk. Lamk. v. 1818. Is *Venus umbonaria*.  
 —*C. vetusta*, Roemer, 25, pl. vi. f. 1843. Is *Cardinia vetusta*, d'Orbigny.
94. *C. Vieilbancii*, d'Orb. Prod. 1. 1850.  
 Hab. France, (fossil.)  
 —*C. vulgaris*, Sowb. Gen. of Shells. Is *Cyprina Islandica*, Lam.

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Synopsis of the Subfamily of **CLUPEINÆ**, with descriptions of new Genera.

BY THEODORE GILL.

To enable the reader to better understand the descriptions of the new genera to be now proposed, we give the characters of the groups of the Clupeinæ as understood by us, and a synopsis of all the known genera.

The family of Clupeoids, as restricted by the learned French ichthyologist who has so well continued the great ichthyological work planned by Cuvier, is one of the most natural in the animal kingdom. There is none that exhibits greater variety of dentition; none in which such variation is accompanied by so little difference of form or anatomical peculiarities. In the group of the true Herrings or *Clupeæ*, as we shall restrict it, there are included seventeen dis-1861.]

tinct genera, which are almost entirely characterized by the different combinations, of teeth on the jaws and in the mouth, or the entire absence of them. There is no essential difference in the form of those teeth, and from their relative positions alone are the genera distinguished. We find in the subfamily almost every variety of dentition; almost all possible combinations from that exhibited by the genus *Rogenia*, of which the famous white bait of the English, is the type, to the genus of the Shads, in which there are no teeth in any part of the mouth. In *Rogenia*, we find teeth, more or less developed, on every bone that enters into the composition of the mouth, as well as on the tongue. There are vomerine, palatine, pterygoid and lingual teeth, and there are also less developed intermaxillary, supramaxillary and mandibular ones. In *Clupea* or the herrings, and in *Clupeoides* of Bleeker, and *Harengula* of Valenciennes, the dentition is almost as full; perhaps more perfect in the last, if we regard the size or development of the teeth. There is in each of those genera an absence of teeth on one set of the bones which enter into the composition of the mouth; all the others are provided with teeth as in *Rogenia*, but stronger on the jaws. In *Harengula*, the deficiency is of vomerine teeth; in *Clupeoides*, of maxillary,\* and in the herrings, the pterygoid bones are destitute. In the last group the palatine bones have also only a few isolated ones on the outside, and these being readily deciduous, may be easily overlooked. From the herrings, we pass by *Kowala*, *Spratelloides* and *Sardinella* of Valenciennes, and our genera *Alausella* and *Pomolobus* to *Spratella*, in which there are teeth only on the palatines and tongue; *Meletta*, in which the tongue alone is furnished, and finally to *Alausa* of Valenciennes, and *Brevoortia* of Gill, in which all the bones, as well as the tongue, are edentulous. Notwithstanding this variation of dentition, so uniform is the shape of the body; so little modification is there of any other part or member, that we might, perhaps with propriety, if we did not look to the dentition, unite them all in one great genus. The only very sensible variation from the type as exhibited in the herring, is that which has furnished us with the genus *Brevoortia*. This genus, established on the well known and very abundant "Morsebunker" or "menhaden" of our eastern coast, is distinguished from almost all of its associates, by the large head, and the more backward position of the dorsal fin, which is situated over the interval between the ventral fins and the anal. These variations, in connection with the ciliated or deeply pectinated posterior margins of the scales, have appeared to us to be of generic importance. On that genus we have bestowed the name of *Brevoortia*, in honor of Mr. J. Carson Brevoort, the well known ichthyologist of New York.

In the subfamily of the *Clupeinæ*, we include both *Pellona* of Valenciennes, and *Pristigaster* of Cuvier, in a distinct group; these genera are distinguished from the true herrings, by the long anal fin, and in *Pellona* by generally more anterior position of the ventrals; the dorsal is usually situated nearer to the former than to the latter. As there is no gradation between the long anal of the *Pellona* and *Pristigasters* to the short one of the true herrings, and as the difference of the length gives a peculiar facies to each group, the section so distinguished appears to be natural. For the present at least, we may retain *Pellona* and *Pristigaster* together, notwithstanding the want of ventral fins in the latter. For the group thus formed we may employ the name of *Pellonæ*.

In retaining Valenciennes' name of *Pellona* for the group which he so designated, we are well aware that he had been anticipated by both Swainson and Gray, or rather Richardson. The former naturalist has characterized, as well at least as was customary with him in ichthyology, the genus to which he gave the name of *Platygaster*. That name we are prevented from employing, as it had been previously applied by Latreille to a valid genus of Hymenopterous in-

\*There are at least none mentioned as being present in the supramaxillary bones, by Bleeker, to whom we are indebted for our knowledge of the genus.

sects, and it had also been used by Zetterstedt for a genus of Diptera, at nearly the same period as Swainson. A species of the same genus is also described by Sir John Richardson, in his Report "on the Ichthyology of the seas of China and Japan," as *Ilisha abnormis*. This name is attributed to Gray in a British Museum catalogue; we have never seen a catalogue in which the name occurs. It was, indeed, probably manuscript: we do not therefore know what Dr. Gray intended by the name. As Richardson suggests, the name appears to be "evidently taken from the specific appellation of one of Buchanan Hamilton's *Clupea*." But the *Clupea ilisha* of that naturalist is a true *Alausa*. If that species was intended by Gray as the type of his genus, it should be regarded as a mere synonyme of *Alausa*. If, however, the generic name of *Ilisha* was first published by Richardson, perhaps it will have to be retained in his name, for either the whole genus, or that section inhabiting the old world, and embracing species whose body is more slender, and which have a less gibbous abdomen than the species of South America. As Valenciennes was the first to well restrict the genus and illustrate its affinities, we prefer to modify his generic name for the subfamily.

#### Group CLUPEÆ Gill.

Anal fin little longer than high, commencing some distance behind the vertical of the posterior rays of the dorsal, and nearly intermediate between the ventral and caudal fins.

#### A.

With no spurious dorsal or anal fins.

#### Genus I. CLUPEA (Linn.) Val.

*Syn.* *Clupea* Val. Hist. Nat. des Poissons, vol. xx., p. 28, 1847.

Body elongated and slender. Minute teeth on the intermaxillaries and near the symphysis of the dentaries. Supra-maxillaries delicately crenulated. More evident teeth in a longitudinal band on the vomer, and on the tongue. Several readily deciduous teeth on the external borders of the palatines.

Type. *Clupea harengus* Linn.

*Syn.* *Clupea harengus* Val. Hist. N. des Poissons, vol. xx., 30.

#### Genus II. SARDINELLA Val.

*Syn.* *Sardinella* Val. Hist. Nat. des Poissons, vol. xx., p. 28, 1847.

Body elongated and slender. Minute villiform teeth on the anterior extremity of the palatine bones, on the internal borders of the pterygoids, and on the tongue. Supramaxillaries occasionally scarcely crenulated near the extremities.

Type. *Sardinella aurita* Val. Hist. Nat. des Poissons, vol. xx., p. 263.

#### Genus III. ROGENIA Val.

*Syn.* *Rogenia* Val. Hist. Nat. des Poissons, vol. xx., p. 340, 1847.

Body elongated and slender. Very minute and almost imperceptible teeth on the intermaxillaries and dentaries; stronger ones on the vomer, palatines, pterygoids and tongue.

Type. *Rogenia alba* Val.

*Syn.* *Clupea alba* Yarrell.

#### Genus IV. CLUPEONIA Val.

*Syn.* *Clupeonia* Val. Hist. Nat. des Poissons, vol. xx., p. 345.

Teeth only on the pterygoids, and in a longitudinal band on the tongue.

Type. *Clupeonia Jussieui* Val.

*Syn.* *Clupanodon Jussieui* Lac. Hist. Nat. des Poissons, vol. v, pp. 471, 474. 1861.]

## Genus V. HARENGULA Val.

*Syn.* Harengula Val. Hist. Nat. des Poissons, vol. xx. p. 277, 1847.

Body elongated and slender. Minute teeth on the intermaxillaries, dentaries, palatines, pterygoids and tongue. Supramaxillaries scarcely crenulated.

Type. Harengula latula Val.

## Genus VI. CLUPEOIDES Bleeker.

*Syn.* Clupeoides Bleeker, Naturkundig Tijdschrift voor Nederlandsch Indie, vol. i. p. 274.

Body elongated and slender. Minute teeth on the intermaxillaries, dentaries, vomer, palatines, pterygoids and tongue.

Type. Clupeoides borneensis Bleeker.

## Genus VII. SPRATELLOIDES Bleeker.

*Syn.* Spratelloides Bleeker, Naturkundig Tijdschrift voor Nederlandsch Indie, vol. ix. p. 775.

Teeth on the intermaxillaries, dentaries, vomer and tongue.

Type. Spratelloides argyrotaenia Bleeker.

## Genus VIII. SPRATELLA Val.

*Syn.* Spratella Val. Hist. Nat. des Poissons, vol. xx., p. 356.

Body elongated and slender. Teeth only on the palatine bones and tongue.

Type. Spratella pumila Val. Hist. Nat. des Poissons, vol. xx., p. 357, 1857.

## Genus IX. KOWALA Val.

*Syn.* Kowala Val. Hist. Nat. des Poissons, vol. xx., p. 362.

Body elliptical. Teeth only on the jaws and pterygoids.

Type. Kowala albella Val.

## Genus X. ALAUSSELLA Gill.

*Syn.* Alausella Gill. Proceed.

Body oblong, ovate. Teeth in the intermaxillaries and dentaries scattered near the symphysis, and on the tongue. Supramaxillaries finely denticated.

Type. Alausella parvula Gill.

*Syn.* Clupea parvula Mitchill.

## Genus XI. POMOLOBUS (Raf.) Gill.

*Syn.* Pomolobus Raf. Ichthyologia Ohiensis, p. 38, (fide Kirtland.)

Body elongated and slender. Teeth on the intermaxillaries, behind which, the gums are transversely and slightly sulcated. Few teeth at the symphysis of the lower jaw. Tongue with viliform teeth.

Type. Pomolobus chrysochloris Storer ex Kirtland.

*Syn.* Alosa chrysochloris Kirtland.

## Genus XII. CLUPALOSA Bleeker.

*Syn.* Clupalosa Bleeker, Verhandelingen van het Bataviaasch Genootschap, vol. xxii., Ichth. Mad., pp. 12, 24.

Teeth only on the palatine bones. Lower jaw scarcely denticulated.

Type. Clupalosa bulau.

## Genus XIII. MELETTA Val.

*Syn.* Meletta Val. Hist. Nat. des Poissons, vol. xx., p. 366.

Teeth only in a longitudinal row on the tongue. Dorsal fin with no produced posterior ray.

Type. Meletta vulgaris Val.



## Genus XIV. OPISTHONEMA Gill.

*Syn.* Clupanodon *Lac., partim*, Hist. Nat. des Poissons, vol.

Body oblong oval. Teeth in a longitudinal row on the tongue. Dorsal fin with its last ray filiform.

Type. *Opisthonema thrissa* Gill.

*Syn.* Clupanodon *thrissa* Lac.

## Genus XV. ALAUSA (Cuv.) Val.

*Syn.* *Alosa* Cuv. Regne Animal

*Alausa* Val. Hist. Nat. des Poissons. vol. xx., p. 389.

Teeth absent, or only some small and easily caducous ones on the jaws. Scales not pectinated. Dorsal fin over the ventrals. Head of moderate size.

Type. *Alausa vulgaris* Cuv.

*Syn.* *Alausa vulgaris* Val. Hist. Nat. des Poissons, vol. xx., p. 391.

## Genus XVI. BREVOORTIA Gill.

*Syn.* *Brevoortia* Gill.

Teeth absent. Scales pectinated on their posterior margins. Dorsal fin nearly over the interval between the ventrals and anal. Head very large.

Type. *Brevoortia menhaden* Gill.

*Syn.* *Alausa menhaden* Val. Hist. Nat. des Poissons, vol. xx., p. 424.

## B.

Provided with true and spurious anal fins, entirely distinct from each other; the former of the normal size; the latter with two or more thick and well developed rays.

## Genus XVII. CLUPEICHTHYS Bleeker.

*Syn.* *Clupeichthys* Bleeker, Naturkundig Tijdschrift voor Nederlandsch Indie, vol. ix., p. 274, 1855.

Intermaxillary bones prominent; the lower little longer than the upper, conspicuous teeth on the intermaxillary, supramaxillary, palatine and pterygoid bones, and in a median longitudinal band on the tongue.

A single species is found in the rivers of the island of Sumatra.\*

Type. *Clupeichthys goniognathus* Bleeker.

## Group PELLONÆ Gill.

Anal fin elongated, commencing under or anterior to the last rays of the dorsal, and near the ventrals.

a. Ventral fins present, and situated anterior to or under the first rays of the dorsal fin.

## Genus XVIII. PELLONA Val.

*Syn.* *Platygaster* Swainson, Natural History of Fishes, Amphibians and Reptiles, vol. ii. p. 294, 1839. (Not *Platygaster Latreille*.)

*Ilisha* (Gray,) Richardson, Fifteenth Annual Report of the British Association. A.S.,

*Pellona* Cuv. et Val. Hist. Nat. des Poissons, vol. xx. p. 301.

Body compressed, varying in form; in the typical species, the abdomen is

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\*Buchanan Hamilton, in his "Account of the Fishes found in the river Ganges and its branches," p. 236, has described a Clupeoid which has also two fins, the last provided with four rays, but there are said to be no teeth. It has been referred to a new genus and called *Corica sobrona*. If it is true that there are no teeth, the species can not be congeneric with *Clupeichthys goniognathus*. The work of Hamilton is not at present accessible to us.

very convex, but in most, the shape resembles that of the true Clupeoids. Bands of teeth on the intermaxillary, maxillary, dentary, palatine and pterygoid bones, and on the tongue, most of which are very small and almost imperceptible.

The genus is represented by species in the rivers and seas of South America, Asia and Africa. Those of South America have the abdomen very convex; in those of the Old World, it is much less so.

Type. *Pellona Orbignyana Val.*

*b.* Ventral fins absent.

#### Genus XIX. PRISTIGASTER Cuv.

*Syn.* *Pristigaster Cuv.* Regne Animal, vol. ii.

*Pristigaster Val.* Hist. Nat. des Poissons, vol. xx. p. 326.

Body compressed, with the back slightly arched, and with the abdomen very convex, and strongly serrated. Teeth present on the intermaxillary, maxillary, dentary, palatine and pterygoid bones, as well as on the tongue. Dorsal fin higher than long, situated on the anterior half of the back. Lateral line straight.

The genus as now restricted contains only the South American species, distinguished by the scarcely arched back and very convex belly. The Indian species belong to another genus.

Type. *Pristigaster cayanus Cuv.*

#### Genus XX. OPISTHOPTERUS Gill.

*Syn.?* *Apterygia Gray,* Illustrations of Indian Zoology.

*Pristigaster sp. Val.,* Hist. Nat. des Poissons, vol. xx.

Body compressed with the nape saillient, and the back convex; the abdomen convex, and strongly serrated. Teeth present on the intermaxillary, maxillary, dentary, palatine and pterygoid bones, and on the tongue. Dorsal fin low and small, situated at the end of the second third of the back's length.

Type. *Opisthopterus tartoor Gill.*

*Syn.* *Pristigaster tartoor Val.,* Hist. Nat. des Poissons, vol. xx. p. 328.

### Descriptions of Twenty-five New Species of UNIONIDÆ from Georgia, Alabama, Mississippi, Tennessee and Florida.

BY ISAAC LEA.

*UNIO FABACEUS.*—Testâ lævi, oblongâ, subquadratâ, subinflatâ, posticè subbiangulâ, subæquilaterali; valvulis crassiusculis, anticè crassioribus; natibus prominulis; epidermide tenebroso-fuscâ, micante, obsoletè radiatâ; dentibus cardinalibus parvis, erectis, acuminatis, crenulatis; lateralibus curtis, lamellatis subcurvisque; margaritâ purpurascente, salmonis colore tinctâ et valdè iridescente.

*Hab.*—Oostanula River, Georgia. Bishop Elliott.

*UNIO IRRASUS.*—Testâ lævi, rotundo-trigonâ, inflatâ, posticè obtusè angulatâ, anticè rotundâ; valvulis subcrassis, anticè crassioribus; natibus subelevatis, crassis; epidermide luteo-fuscâ, vel obsoletè radiatâ vel eradiatâ; dentibus cardinalibus crassis, elevatis, subcompressis crenulatisque; lateralibus curtis, crassis, obliquis rectisque; margaritâ argenteâ et iridescente.

*Hab.*—Etowah River, Georgia. Rev. G. White.

*UNIO OCMULGEENSIS.*—Testâ lævi, transversâ, inflatâ, posticè obtusè biangulatâ, anticè subtruncatâ, valdè inæquilaterali; valvulis crassis, anticè crassioribus; natibus prominulis; epidermide tenebroso-fuscâ, eradiatâ, supernè micaute, infernè valdè striatâ; dentibus cardinalibus parviusculis, pyramidatis

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striatisque; lateralibus prælongis, lamellatis subrectisque; margaritâ argenteâ et iridescente.

*Hab.*—Little Ocmulgee River, Lumber City, Georgia. S. W. Wilson, M. D.

UNIO CICUR.—Testâ lævi, oblongâ, subinflatâ, ad latere subplanulatâ, posticè rotundatâ, valdè inæquilaterali; valvulis tenuibus subdiaphanis; natibus subprominentibus, ad apices undulatis; epidermide olivaceâ, eradiatâ; dentibus cardinalibus parvissimis, compressis subrectisque; lateralibus longis, prætenuis, lamellatis subrectisque; margaritâ cæreuleâ et valdè iridescente.

*Hab.*—Little Ocmulgee River, Georgia. S. W. Wilson, M. D.

UNIO CRAPULUS.—Testâ lævi, obliquâ, ventricosâ, ad umbones valdè tumidâ, valdè inæquilaterali, posticè rotundatâ, anticè truncatâ: valvulis percrassis, anticè crassioribus; natibus valdè prominentibus crassisque; epidermide luteofuscâ, eradiatâ; dentibus cardinalibus percrassis, pyramidatis, corrugatis, in utroque valvulo duplicitibus; lateralibus percrassis, corrugatis, obliquis subcurvisque; margaritâ albâ et paulisper iridescente.

*Hab.*—Etowah River, Georgia. Rev. G. White.

UNIO BEADLEIANUS.—Testâ lævi, subrotundâ, ventricosâ, subæquilaterali, anticè rotundatâ, posticè obtusè angulatâ; valvulis crassis, anticè crassioribus, natibus subelevatis, incurvis; epidermide tenebroso-fuscâ, obsoletè radiatâ; dentibus cardinalibus magnis, erectis, compressis corrugatisque; lateralibus crassis, curtis corrugatisque; margaritâ vel albâ vel rosæâ, et iridescente.

*Hab.*—Pearl River, Jackson, Mississippi. Rev. E. R. Beadle.

UNIO CHICKASAWHENSIS.—Testâ lævi, subrotundâ, subcompressâ, sublenticulari, inæquilaterali, posticè obtusè angulatâ, anticè rotundâ; valvulis crassiusculis, anticè paulisper crassioribus; natibus prominulis; epidermide tenebroso-fuscâ, eradiatâ, excillissimè striatâ; dentibus cardinalibus parviusculis, pyramidatis, corrugatis crenulatisque; lateralibus brevibus, subvalidis subcurvisque; margaritâ rosaceâ et valdè iridescente.

*Hab.*—Chickasawha River, Mississippi. W. Spillman, M. D.

UNIO CINNAMOMICUS.—Testâ lævi, ellipticâ, inflatâ, ad umbones tumidâ, inæquilaterali, posticè angulatâ, anticè rotundâ; valvulis subcrassis, anticè crassioribus; natibus subprominentibus; epidermide cinnamomicâ, infernè striatâ, eradiatâ, dentibus cardinalibus parviusculis, erectis, subcompressis crenulatisque, lateralibus curtis subrectisque; margaritâ albidâ et valdè iridescente.

*Hab.*—Tombigbee River, Columbus, Mississippi. W. Spillman, M. D.

UNIO PAUPERCULUS.—Testâ lævi, subrotundâ, subcompressâ, subequilaterali, posticè subrotundâ, anticè rotundâ; valvulis subcrassis, anticè crassioribus; natibus prominulis; epidermide luteo-corneâ, eradiatâ; dentibus cardinalibus magnis, elevatis, decussatis; lateralibus brevissimis, obliquis rectisque; margaritâ albâ et iridescente.

*Hab.*—Stream near Columbus, Mississippi. W. Spillman, M. D.

UNIO SPILLMANII.—Testâ lævi, ellipticâ, subinflatâ, inæquilaterali, posticè obtusè angulatâ, anticè rotundatâ; valvulis subcrassis, anticè paulisper crassioribus; natibus prominulis; epidermide tenebroso-fuscâ vel luteo-fuscâ, ad umbones nitidâ, radiatâ; dentibus cardinalibus crassiusculis, obtusè pyramidatis, corrugatis; lateralibus longis, crassis corrugatisque; margaritâ vel albâ vel salmonis colore tinctâ et valdè iridescente.

*Hab.*—Luxpalila Creek, near Columbus, Mississippi. W. Spillman, M. D.

UNIO FLAVIDULUS.—Testâ lævi, ellipticâ, subinflatâ, valdè inæquilaterali, posticè obtusè angulatâ, anticè rotundâ; valvulis subtenuibus, anticè crassioribus; natibus prominulis; epidermide vel luteo-fuscâ vel luteo-viridi, eradiatâ; dentibus cardinalibus parviusculis, erectis, compressis, in utroque valvulo duplici-

bus; lateralibus sublongis, lamellatis subrectisque; margaritâ albâ et iridescente.

*Hab.*—Stream near Columbus, Mississippi. W. Spillman, M. D.

**UNIO ANATICULUS.**—Testâ lævi, obliquâ, ad umbones valdè tumidâ, anticè truncatâ, posticè obtuse angulatâ, valdè inæquilaterali; valvulis crassiusculis, anticè crassioribus; natibus elevatis, crassis, incurvis, ferè terminalibus; epidermide castaneâ, vittatâ, obsoletè radiatâ, dentibus cardinalibus subcrassis, subpyramidatis crenulatisque; lateralibus crassis, obliquis subrectisque; margaritâ argenteâ et iridescente.

*Hab.*—Near Columbus, Mississippi. W. Spillman, M. D.

**UNIO RUBIDUS.**—Testâ sulcatâ, subtriangulari, valdè inflatâ, ad laterè planulatâ, subæquilaterali, valvulis subcrassis, anticè crassioribus; natibus subprominentibus, subinflatis; epidermide tenebroso-rufò-fuscâ, eradiatâ, supernè micanti, infernè striatâ; dentibus cardinalibus crassiusculis, elevatis, subpyramidatis crenulatisque; lateralibus sublongis, curvis subcrassisque; margaritâ vel rosacèâ vel albâ vel salmonis colore tinctâ et iridescente.

*Hab.*—Tombigbee River, Mississippi. W. Spillman, M. D.; Coosa River and Big Prairie Creek, Alabama. E. R. Showalter, M. D.

**UNIO DECUMBENS.**—Testâ lævi, arcuatâ, valdè compressâ, ad laterè planulatâ, inæquilaterali, posticè biangulatâ, anticè rotundâ; valvulis subtenueibus, anticè et posticè paulisper crassioribus; natibus prominulis; epidermide tenebroso-rufò-fuscâ, obsoletè radiatâ, transversè striatâ; dentibus cardinalibus minimis, subcompressis, in utroque valvulo duplicibus; lateralibus prælongis, arcuatis; margaritâ purpurascente, et valdè iridescente.

*Hab.*—Alabama. E. R. Showalter, M. D.

**UNIO GERMANUS.**—Testâ lævi, ellipticâ, subinflatâ, inæquilaterali, posticè subbiangulatâ, anticè rotundâ; valvulis crassiusculis, anticè crassioribus; natibus subprominentibus, ad apices concentricè rugoso-undulatis; epidermide tenebroso-fuscâ, eradiatâ, transversè striatâ; dentibus cardinalibus parvis, erectis, compressis, crenulatis, acuminatis; lateralibus tenuibus subcurvisque; margaritâ purpurascente et valdè iridescente.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

**UNIO LEWISII.**—Testâ lævi, subrotundâ, suborbiculari, subæquilaterali; valvulis crassissimis, anticè crassioribus; natibus elevatis, tumidis incurvisque; epidermide luteolâ, punctatâ; dentibus cardinalibus crassissimis, erectis crenulatisque; lateralibus crassissimis, brevibus et obliquis; margaritâ albâ et iridescente.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

**UNIO MEDIUS.**—Testâ lævi, obliquâ, valdè inflatâ, valdè inæquilaterali, posticè obtusè angulatâ, anticè obliquè rotundatâ; valvulis crassis, posticè crassioribus; natibus elevatis, tumidis; epidermide fuscâ, maculatâ, infernè striatâ, supernè micanti; dentibus cardinalibus crassis, pyramidatis crenulatisque; lateralibus crassis, rectis brevibusque; margaritâ argenteâ et iridescente.

*Hab.*—Near Uniontown, Alabama. E. R. Showalter, M. D.

**UNIO CONCOLOR.**—Testâ lævi, obliquè ellipticâ, subinflatâ, inæquilaterali, posticè subbiangulatâ, anticè rotundâ; valvulis subcrassis, anticè crassioribus; natibus subprominentibus; epidermide tenebroso-olivâ, eradiatâ, ad umbones nitidâ, infernè striatâ; dentibus cardinalibus crassiusculis, erectis, obtusè compressis; lateralibus sublongis, obliquis subrectisque; margaritâ albâ et iridescente.

*Hab.*—Big Prairie Creek, Alabama. E. R. Showalter, M. D.

**UNIO VERUS.**—Testâ lævi, subtriangulari, subcompressâ, valdè inæquilaterali, posticè ferè rotundâ, anticè rotundâ; valvulis crassiusculis, anticè crassiori-

bus; natibus elevatis; epidermide tenebroso-olivâ, eradiatâ, maculatâ, vittatâ, ad umbones micanti, infernè striatâ; dentibus cardinalibus parviusculis, compresso-pyramidatis striatisque; lateralibus, subbrevibus, obliquis subrectisque; margarita albâ et iridescente.

*Hab.*—Cahawba River, Perry Co., Alabama. E. R. Showalter, M. D.

**UNIO ASPERATUS.**—Testâ valdè tuberculatâ, subrotundâ, inflatâ, anticè et posticè rotundâ, subequilaterali; valvulis crassis, anticè crassioribus; natibus valdè prominentibus; epidermide rufo-luteâ, eradiatâ; dentibus cardinalibus percassis, obtuso-conicis, corrugatis; lateralibus brevissimis, valdè obliquis rectisque; margaritâ argenteâ et iridescente.

*Hab.*—Alabama River, Claiborne, Alabama. Judge Tait.

**UNIO ORNATUS.**—Testâ lævi, subrotundâ, compressâ, inæquilaterali, posticè subrotundâ, anticè rotundâ; valvulis crassiusculis, anticè crassioribus; natibus subprominentibus, ad apices rugoso-undulatis; epidermide melleâ, viridi maculatâ, supernè nitidâ, infernè striatâ; dentibus cardinalibus parviusculis, sulcatis; lateralibus brevibus, obliquis rectisque; margaritâ argenteâ et valdè iridescente.

*Hab.*—Alabama? T. R. Ingalls, M. D.

**UNIO PERPURPUREUS.**—Testâ lævi, ellipticâ, subinflatâ, inæquilaterali, posticè et anticè rotundatâ; valvulis subcrassis, anticè crassioribus; natibus prominulis; epidermide tenebroso-iridâ, nigricente, radiis capillaris; dentibus cardinalibus parviusculis, erectis, conicis, in utroque valvulo duplicibus, striatis; lateralibus longis rectisque; margaritâ valdè purpureâ et iridescente.

*Hab.*—Tennessee. J. G. Anthony.

**UNIO ANTHONYI.**—Testâ lævi, ellipticâ, inflatâ, ad laterè planiusculâ, posticè obtusè biangulatâ, posticè rotundatâ, inæquilaterali; valvulis subtenuibus, anticè paulisper crassioribus; natibus prominulis; epidermide luteo-olivâ, eradiatâ; dentibus cardinalibus parvis, obliquis, subcompressis crenulatisque; lateralibus longis, lamellatis subcurvisque; margaritâ cæruleo-albâ et iridescente.

*Hab.*—Florida. J. G. Anthony.

**MARGARITANA QUADRATA.**—Testâ lævi, oblongâ, subcompressâ, ad laterè planulatâ, subæquilaterali, posticè obtusè angulatâ, anticè rotundâ; valvulis subtenuibus, anticè paulisper crassioribus; natibus prominulis, ad apices undulatis; epidermide luteolâ, viridi-radiatâ; dentibus cardinalibus subgrandibus, obliquis, compressis, triangularis, erectis subcurvisque; margaritâ albâ, supernè salmonis colore tinctâ, et valdè iridescente.

*Hab.*—East Tennessee, President Estabrook.

**MARGARITANA ALABAMENSIS.**—Testâ lævi, oblongâ, inflatâ, ad laterè paulisper planulatâ, inæquilaterali, posticè obtusè biangulatâ, anticè oblique rotundatâ; valvulis subcrassis, anticè paulisper crassioribus; natibus prominulis, ad apices rugoso undulatis; epidermide luteo-olivâ, politâ, eradiatâ; dentibus cardinalibus parvis, suberectis; margaritâ albâ et salmoniâ et iridescente.

*Hab.*—Talladega Creek, Alabama. W. Spillman, M. D.

### Descriptions of New Recent Shells from the Coast of South Carolina.

BY EDMUND RAVENEL, M. D.

#### COLUMBELLA SIMILIS.

This has generally been considered the young or immature shell of "*C. avara*." The *avara* is a larger shell, and has fewer and much larger ribs at the upper portion of the body whorl. It has about 11 ribs; whereas this shell has often as many as 20 ribs, but the number varies. The *avara* never has all of the 1861.]

whorls decidedly ribbed; the larger ribs are usually confined to the body whorl, sometimes extending to the second; but above this, there is a space embracing one or more whorls, which is smooth or slightly wrinkled, and the two or three upper whorls are regularly ribbed to the apex. With the "*similis*," the ribs on the body whorl are more numerous, smaller and more regular generally, and occupy more of the whorl, and generally all of the whorls are regularly ribbed to the apex. The general appearance of the two shells differs, one being always smaller than the other. The revolving striæ are very similar in the two shells; the same may be said of the coloring, the "*similis*" being the most prettily mottled. It must, however, be acknowledged, that the two run into each other so nearly, that occasionally, it is not easy to determine a specimen. The uncertainty is increased by the difficulty in following up a series from the very young to the mature state of either. I have not been able to compare the animals; common on the coasts of North and South Carolina.

#### COLUMBELLA TRANSIRATA.

Shell elevated, conical, sharp at the apex; whorls nine, nearly flat, rather closely ribbed, ribs and interspaces about equal, with five equidistant revolving striæ, from the anterior canal to the apex. Upon the upper whorls, one line is lost at the suture, where the whorls seem to overlap as they ascend; the body whorl is much the largest, and is angulated from opposite the posterior end of the aperture, revolving to near the centre of the outer lip; to this angle the ribs are half the number that are upon the whorl immediately above, and at the suture are nodulous; the nodules being generally white, give a decided character to the shell. Below this angle the ribs are much less decided, and again resume their original number, and by holding the canal towards the eye, the intermediate rib can be traced, running up between the larger ones, gradually becoming obsolete; and below this angle the revolving striæ become more numerous and more decided, crossing the ribs so as to produce a reticulated appearance, except as they approach the end of the anterior canal, where the ribs cease and the revolving striæ alone are to be seen.

Aperture moderate, oblong, rather narrow, very little hollowed on the pillar lip; pillar callus with obsolete denticulations; outer lip not decidedly thickened, denticulate slightly within.

Color varying from a light straw to a dark brown, with the ends of the ribs at the suture of the body whorl and at the angle on this whorl, white. Some of the specimens have blotches of white, which give the whole shell a mottled appearance. It is larger than *C. avara* Say, being nearly an inch in length. This shell and "*C. similis*," are allied to "*C. avara*," but are very distinct. They belong to the group of which *C. avara* Say is the type.

From the stomachs of fish off Charleston bar, and is more abundant than any species obtained from this source as yet. Dr. Stimpson found it at Beaufort, N. C.

#### COLUMBELLA IONTHA.

Shell fusiform, strong, small, with nine flat, ribbed whorls, white, with brown blotches and lines. Suture deep and distinct, both the upper and lower edges of the whorls being chamfered; the ribs on the body whorl near the aperture less distinct than on other parts of the shell; anterior portion of this whorl with numerous revolving striæ: these impressed striæ give place to colored lines as they ascend, and these are continued more or less distinct to the apex, being visible only as they cross the ribs and not in the intermediate spaces, except here and there, where being more deeply colored and descending between the ribs, produce the blotches which mark the shell.

The aperture is small, rather wide in proportion, the pillar lip much hollowed above, suddenly becoming straight to form the canal; outer lip considerably enlarged, denticulated sparsely within; length a little over  $\frac{1}{4}$  of an inch.

This is a very pretty little shell, allied to the group which embraces

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*C. pulchella* Sow. and *C. Jaspidea* Sow., of West Indies; this species being more elongated.

A single specimen obtained from the stomach of a blackfish, off Charleston bar.

#### COLUMBELLA NIVEA.

Shell small, delicate, elongated-conic, white, immaculate, smooth, polished. prettily striated on the outer part of the canal, lower whorl longer than the spire, suture distinct, with one white revolving line a little below it on the whorls, like a double suture; pillar covered with callus, much hollowed, suddenly becoming straight to form the canal; callus ends in a distinct edge; outer lip a little thickened, sparsely denticulated within, the posterior tooth being decidedly the most prominent.

This is a pretty little shell, allied to *Buccinum rosaceum* Gould, and *C. lunata* Say.

A single specimen was taken from the stomach of a fish off Charleston bar.

#### NASSA CONSENSA.

Shell ovate-conical, ribbed and crossed by numerous revolving striæ; whorls 7, and the apex; whorls rounded, with eleven strong ribs; suture deep. Scoloped by the ribs; revolving striæ crossing the ribs, as well as the interstitial spaces.

Aperture nearly oval, outer lip much thickened, denticulate within, the largest tooth being in the form of a ridge; next the canal; pillar much hollowed; with slight callus above, which is much thickened to form the canal, canal short oblique, turned backwards; the lower portion of the pillar which turns out of the aperture to form the canal is quite white with crowded, inconspicuous, revolving striæ; on the pillar at the edge of the canal there is one deep groove.

Color of the shell generally yellowish-brown, with a narrow deep brown band immediately next the white projection at the canal; next to this, on the body whorl, is a much wider band of lighter brown, which revolves at the suture to the apex of the shell; all other portions of the shell are marked by delicate lines more or less grouped, of yellowish-brown. On the thickened portion of the outer lip these lines are here and there more deeply colored in spots.

This is a very pretty shell; a single specimen was found in a fish off Charleston bar; 14 fathoms.

It resembles *N. incrassata* of England, and we have seen it in collections labelled "*N. ambigua* Moret, West Indies."

#### DRILLA ELOZANTHA.

Shell robust, conico-cylindrical, with ten whorls, which are bi-carinate, by being deeply grooved immediately above the suture, and again in the upper half of the whorl. The ridge left between these grooves is ornamented by ten strong, yellow, smooth, shining tubercles; the upper edge of the whorl is again bevelled, forming the second carina, which is not at all nodulous. Below the nodulous carena on the body whorl, there are obsolete ribs, crossed by four nodulous ridges, the first touching the tubercles of the principal carina; below these there are eight others, some of which are obscurely nodulous; on all parts of the shell not occupied by the tubercles or carina, there are numerous fine equidistant striæ, requiring the glass to bring them to view.

The aperture small, outer line made oblique by the deep sinus of the thick outer lip, just below the suture; the pillar is nearly straight, with a strong callus, the edge of which is thick and well defined.

Color deep brown, generally, becoming a little lighter from the tubercles to the suture, embracing the upper carina; near the extremity of the canal there is a lighter colored band, taking in three of the ridges; beyond that to the extremity is again almost black. This shell is allied to the "*P. ornata*"

d'Orbigny; the *ornata* has 12 tubercles, the whorls, "bipartitis, antice, albidis, postice, zona, fulva notatis." The figure corresponds less than the description, with the present species.

Obtained from stomachs of fish off Charleston bar; the three specimens found correspond accurately; all dead.

M. d'Orbigny describes another species of this group "*P. alba-maculata*," but it cannot be confounded with the others.

#### LIOSCARDIUM PYGMEUM.

Shell ovate, triangular, very oblique somewhat compressed, smooth, polished, with a few obsolete ribs at each end, and obsoletely waved by the lines of growth; beaks small, prominent, nearly touching, very much in advance of the centre, anterior end short, regularly curved, posterior end produced, somewhat angular.

Color reddish-brown, in zig-zag spots and blotches upon a white ground. Internally polished, of a reddish-brown, clouded, with some patches of yellow, and a little white, with obscure ribs, which become more conspicuous near the margin, crenulating the entire margin.

Length 0.78 in., breadth 0.7 in.

This is a very pretty shell, much more compressed, a little thicker and stronger than "*C. Morsini*." Taken from the stomachs of fish off Charleston bar. Many imperfect specimens were obtained: the gastric fluids seem to act readily upon it and remove the polish and color very soon; many of the valves were still held together by the ligament, when the substance of the shell was almost destroyed. It is more oblique than *L. serratum*.

#### LITHOMOMUS PORFICATUS.

Shell thin, fragile, white: from about the middle to the anterior end covered with a thin calcareous coat: from this to the posterior end quite white. Beaks very near the anterior end, but not terminal; posterior end produced, much elongated, terminating in a narrow projection on each valve, from the double margin on one valve and from the basal margin on the others so arranged that when the shell is closed, these projections cross each other, resembling somewhat the claw of a crab. Anterior end round, and when the shell is closed it is cylindrical from the anterior end as far as an angle on the dorsal margin, just posterior to the termination of the ligament: from this point it tapers gradually to the end of the shell proper, where the projections are formed by the sudden scooping out of the valves, the one above and the other below.

Within light salmon color, shining and iridescent, the projecting points are entirely white.

This interesting shell was found imbedded in a mass of coral drawn up by a fishing line from the "Blackfish Banks," off Charleston bar, 14 fathoms. There was quite a colony of them in the thicker part of the coral, most of them small, about  $\frac{1}{2}$  inch: the largest specimen removed was about  $1\frac{1}{2}$  inch. The shell was completely imbedded in a cavity of its exact form, only a little larger, quite smooth within, communicating with the exterior by a small, short, open tube, through which the white points protruded. Upon breaking open the cavity, the shell was found attached by a byssus.

### Synopsis of the Subfamily of PERCINE.

BY THEODORE GILL.

The present synopsis of the fishes of the subfamily of *Percina* has resulted from the investigations made of the comparative characters of the genera and species of *Labrax*. It was originally prepared for Captain J. H. Simpson's forthcoming report of his Explorations across the continent in the years 1858—

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1859. but it has been deemed advisable to have it published in the Proceedings of the Academy.

The family of Percoids, as finally restricted by Cuvier in the second edition of his "Regne Animal," contained too unlike and heterogeneous an assemblage of genera to be deemed a natural one. The section chiefly embracing the species of the old Linnean genus *Percia* having seven branchiostegal rays, have a strong family resemblance, with, perhaps, the exception of the genera *Apogon* and *Chilodipterus* of Lacepede, *Pomatomus* of Risso, and *Ambassis* of Commerson. The last mentioned genera, although placed in the section with two dorsal fins and seven branchiostegal rays, and interposed between genera of the subfamily of *Percinae* as here accepted, do not appear to be very nearly related to those fishes.

On the other hand, the genera *Pomoxis* Cuv., *Centrarchus* Cuv., and *Dules* Cuv. and Val., placed in the section of the family with less than seven branchiostegal rays and with a single dorsal fin, appear to be natural allies of the *Percinae*, but at the same time distinguished by some well marked peculiarities.

Of the remaining genera of the Cuvieran Percoids, *Cirrhitus* of Commerson and *Chironemus* of Cuvier form a natural family, to which should perhaps be also referred the *Chilodactyli* of Lacepede placed by Cuvier in his family of *Scianoids*.

The *Priacanthi* of Cuvier appear to be either members of the family of *Holocentroids*, or perhaps, more properly, form a family by themselves related to the former.

The genera *Therapon*, *Datria*, *Pelates* and *Hilotes* of Cuvier and Valenciennes are also natural associates and belong to a peculiar group.

The *Trichodons* of Steller, as well as the *Trachini* of Linnæus, should be also withdrawn from the Percoids, and may perhaps belong to one family, for which Bonaparte's name of *Trachinoidæ* must be retained.

The genera *Percis*, *Pinguipes*, *Sillago* and *Percopsis* of Cuvier certainly do not belong to the family of Percoids. They seem to be quite nearly allied to each other, and to the *Trachinoids*.

The *Uranoscopi* of Linnæus form a very natural family, whose affinities are apparently with the Sclerogenoid *Synanceioids* and the *Blennioids*.

The *Holocentri*, *Myripristis* and *Beryces* have been by most modern naturalists regarded as belonging to a family quite distinct from the Percoids. To the same family has been also referred the genus *Trachichthys* of Shaw, but which may possibly also be the type of a distinct but nearly allied family.

The third division of Cuvier or the abdominal Percoids have also been long since taken from that family and distributed among several distinct ones.

After these numerous subtractions, the family of *Percoids* is still one of the richest in genera and species of the class. It is, at the same time, one of the most natural and most universally distributed. Representatives are found in the fresh water streams and lakes, or along the shores of almost every country on the globe, but the family attains its highest development in the tropical seas. So similar are many of the species found in the most distant regions, that the eye of a naturalist accustomed to the examination can alone detect differences. Species of the same genus are found alike on each side of the Atlantic Ocean, in the Caribbean Sea, on the Western coast of tropical America, and on all the coasts of temperate and tropical Asia and Africa.

While the marine species are thus numerous and similar in the tropical regions of the globe, the fresh water species attain their greatest development in number and variety in the temperate zones. Two genera are represented by closely related species in Europe and North America. Others are peculiar to Europe and are balanced in North America by genera characteristic of that country. The preponderance of both generic types and of species is greatly

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in favor of the "New World." The genera thus peculiar to the different countries are not typical members of the family, but always more or less aberrant. In Europe, are found the *Acerinæ* represented by the genus *Percis* of Klein or *Acerina* of Cuvier; the *Percarinæ* represented by a single genus and species, and the still more aberrant subfamily of *Asperulinæ* with the genus *Asperulus* of Klein or *Aspro* of Cuvier.

As an offset to the European genera, there is found in the fresh waters of the United States, a subfamily containing eight genera and numerous species. The genera which America shares in common with Europe are also more developed in the former country than in the latter, and there are species of two allied genera of which no representatives are found in Europe.

It has been already remarked that the family of Percoids is represented in Europe by three peculiar tribes or subfamilies. In North America there are only two. In the number of widely distinct forms, Europe is therefore richer than America. For the differences existing between the *Grystinæ* and the *Percinæ* can scarcely be considered as of greater value than those between the *Percinæ* on one hand and the *Acerinæ* and *Asperuli* on the other. The differences between the two latter are equally well defined, and it is perhaps doubtful if those genera belong to even the same family as the typical Percoids. But if the family of Percoids has more varied types in the old world, that one found in the new exhibits far more numerous modifications, which indicate generic and specific value.

We now proceed to exhibit the characters of the subfamily of *Percinæ* and give a synopsis of all the known genera.

#### PERCINÆ (Bon.) Gill.

The body is elongated or oblong ovate, more or less compressed. The head in profile is more or less elongated, conical and compressed. The eyes mostly or entirely in the anterior half of the head, are generally of large size. The mouth is large or moderate, with the gape extending at least to the anterior margin of the eye. The teeth are generally villiform, rarely canine, and cover the jaws, vomer and palatine bones. The intermaxillary bones have very short ascending processes, and are scarcely protractile. The nostrils are two on each side, forming the angles of a transversely oblong or elongated quadrangle; the anterior nostrils are subtubular, and the posterior simple apertures. The opercular bones are more or less pectinated or armed with teeth; the operculum terminates in generally one or more spiniform processes. The branchiostegal membrane is very deeply emarginated, the sinus extending to between the corners of the mouth; there the membranes of opposite sides appear to be folded across each other, and leave a very narrow free margin: there are seven branchiostegal rays on each side, decreasing in size quite uniformly to the external. The scales are of moderate or small size, and on the trunk are pectinated and with a narrow mucricated border; those on the head are either pectinated or cycloid; the scales on the cheeks are smallest, and occasionally scarcely perceptible. The dorsals are two in number, and are either entirely disconnected or united at the base by a low membrane: the first dorsal is well developed, and supported by from seven to fifteen spines, the longest of which generally equal the height of the second dorsal. The anal fin is generally shorter than the second dorsal; it has two or three spines and from six to thirteen branched rays. The pectorals are of small or moderate size, in the normal percoid position on the humeral cincture, and have rounded margins. The ventrals are also of moderate size and situated behind the bases of the pectorals; they have each one spine and five gradually decreasing branched rays; the innermost ray is free from the abdomeu, or scarcely connected to it by an axillar membrane.

The subfamily of *Percinæ* as thus limited is a very natural one. Its charac-

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ters in many respects correspond to those of the first group of the Percoids of Günther, called by him *Percina*, but several genera are introduced into the latter which destroy the natural character of the group. The genus *Paralabrax* of Girard belongs more properly to the *Serraninae*, as does also *Etelis* of Cuvier and Valenciennes. On the systematic value of *Acerinae* and *Aspro*, we have already remarked. *Boleosoma* and *Pilcoma* of Dekay are certainly not natural members of the *Percinae*, nor can they even be properly regarded as belonging to the same family; they are more nearly allied to the *Gobioids*. Finally, *Enoplosus* of Cuvier appears to be the type of a distinct subfamily.

The *Percinae*, although represented by many generic forms, are not numerous in species. Many of them are found in fresh water, and probably all of them ascend rivers for a short distance, at some period of the year or are found at their mouths.

The following scheme is supposed to show nearly the natural order and characters of the known genera. As several of them have not been seen by us, we remain in doubt as to their natural position.

### § I.

Intermaxillary and palatine bones provided with some large teeth, arranged in rows; rest of the teeth villiform. Tongue toothless.

#### Genus STIZOSTEDION (Raf.) Girard.

Les Sandres *Cuv.*, Regne Animal, ed. i. vol. ii. p. 294, . . . . . 1817.  
 Stizostedion *Raf.*, Ichthyologia Ohiensis, p. 23, . . . . . 1820.  
 Lucioperca *Cuv. et Val.*, Hist. Nat. des Poissons, vol. ii. p. 110, . . . . . 1828.  
 Sandrus *Stark*, Elements of Natural History, vol. i. p. 465, . . . . . 1828.

Body slender, elongate-fusiform, covered with scales arranged in oblique rows. Head semiconical, quite broad, with the cheeks and opercula generally covered with scales; isolated patches of scales on the sides of the posterior part of the head; rest of the head covered with a naked skin. Preoperculum serrated; operculum armed with from one to five spines. Dorsal fins two; the first supported by from twelve to fifteen spines.

This genus is peculiar to the fresh water streams, rivers and lakes of North America and Europe.

### § II.

Intermaxillary, vomerine and palatine bones provided only with villiform teeth.

#### A.

Pseudobranchiæ present.

#### a.

Head with its superior surface scaleless, or only with two scaly areas on each side of the posterior part. Anterior dorsal fin provided with from seven to fifteen spines. Tongue without teeth.

#### \*

Lateral line linear, ceasing at the base of the caudal fin.

#### Genus PERCA Linn., Cuv.

Perca sp. *Linn.*, Systema Naturæ.

Perca sp. *Cuv. et Val.*, Hist. Nat. des Poissons, vol. ii.

Perca *Günther*, Catalogue of the Acanthopterygian Fish, &c., vol. i. p. 62.

Body elongate-fusiform. Head conical in profile, covered on the cheeks and preoperculum, suboperculum and upper part of the operculum with cycloid scales of moderate size. Operculum generally naked and radiately striated. Preoperculum with its anterior margin well defined and entire, and

1861.]

its true margin serrated posteriorly, and inferiorly armed generally with teeth curved forwards. Operculum with a single spine. Suborbital bone entire. Suprascapular, scapular and coracoid bones serrated. Dorsal fins entirely disconnected; the first provided with from twelve to fifteen spines. Anal fin furnished with two spines.

This genus, of which the common Yellow Perch is the type, is peculiar to Europe and North America. Its species are not yet well defined or known.

Type. *Perca fluviatilis* Linn.

Genus KUHLLIA Gill.

*Perca* sp. *Cuv. et Val.*, Hist. Nat. des Poissons, vol. ii. p. 52.

*Percichthys* sp. *Günther*, Catalogue of the Acanthopterygian Fish, &c., vol. i. p. 62.

Body elongated, fusiform. Head conical. Anterior dorsal fin sustained by nine spines; the posterior with a spine and about eleven articulated rays.

A single species is known; it is peculiar, so far as known, to the Island of Java.

Type. *Kuhllia ciliata* Gill.

*Syn.* *Perca ciliata* *Cuv. et Val.*

Genus NIPHON *Cuv. et Val.*

*Niphon* *Cuv. et Val.*, Hist. Nat. des Poissons, vol. ii. p. 131.

Body elongated and subfusiform. Head oblong-conical in profile. Lower jaw longer. Preoperculum posteriorly serrated, armed below with anteriorly recurved spines, and at the angle with a large horizontal one. Operculum with three strong spines. Suborbital bone serrated. Dorsal fins connected at the base by a little elevated membrane; the anterior with twelve spines. Anal fin with three moderate spines. A single species is found in the Chinese and Japanese seas.

Type. *Niphon spinosus* *Cuv. et Val.*

\* \*

Lateral line elevated and continued between the median rays to the margin of the forked caudal fin.

Genus CENTROPOMUS (Lac.) Cuv.

*Labrax* sp. *Klein.*

*Centropomus* sp. *Lacepede*, Hist. Nat. des Poissons, vol. iv. p. 248.

*Centropomus* *Cuv.*, Regne Animal, ed. i. vol. ii.

Body elongated and fusiform. Head oblong-conical in profile. Lower jaw longer. Preoperculum with the anterior margin furnished with two spines at its angle, and with its posterior and inferior serrated and armed at the angle with larger teeth directed backwards. Operculum with no true spine. Suborbital and suprascapular bones serrated. Dorsal fins entirely disconnected; the first sustained by eight spines. Anal fin trapezoidal, with three spines, the second of which is very large, and with about six branched rays.

Several species are found in the Carriibbean Sea, Gulf of Mexico, and along the neighboring coasts.

Type. *Centropomus undecimalis* Lac.

b.

Head with its dorsal surface covered with scales, extending almost to the nostrils. Anterior dorsal fin furnished with from nine to eleven spines.

b\*.

Teeth on the jaws and palate villiform; tongue or interbranchial isthmus with villiform teeth.

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## Genus LABRAX Klein, Gill.

Labrax sp. *Klein*, *Historiæ Piscium promovendæ* Missus quintus et ultimus, p. 25.

Labrax sp. *Cuv.*, *Regne Animal*, ed. i. vol. ii.

Labrax *Gill*, *Proceedings of Academy of Natural Sciences of Philada.*, 1860, p. 111.

Body elongated and subfusiform. Head conical in profile, mostly covered with cycloid scales. Tongue furnished with teeth arranged in a marginal band and in an oval patch at its base. Preoperculum posteriorly serrated, below armed with spines directed forwards. Operculum with two spines. Suborbital bone entire. Dorsal fins disconnected; the first supported by nine spines. Anal fin with three spines and about ten branched rays.

There is only a single species of the genus *Labrax*, as that genus has recently been restricted; it is found in the Mediterranean Sea and along the western coasts of Europe.

Type. *Labrax diacanthus Gill*.

*Syn.* *Labrax lupus Cuv. et Val., auct.*

## Genus DICENTRARCHUS Gill.

*Perca* sp. *Geoffrey*.

Labrax sp. *Cuv. et Val.*

*Dicentrarchus Gill*, *Proceedings of Academy of Natural Sciences of Philada.*, 1860, p. 111.

This genus has been separated from the preceding on account of the presence of only two spines in the anal fin, and the smaller and less recurved teeth of the inferior margin of the preoperculum.

Only one species is known; it has only been taken in the Mediterranean Sea.

Type. *Dicentrarchus elongatus Gill*.

*Syn.* *Labrax elongata Cuv. et Val.*

Genus ROCCUS *Gill*.

*Roccus Mitchill*.

*Lepibema* sp. *Rafinesque*.

*Roccus Gill*, *Proceedings of Academy of Natural Sciences of Philada.*, p. 111.

Head conical in profile; cheeks covered with cycloid scales. Tongue provided with a band of villiform teeth on each side and in a single or divided patch at its base. Preoperculum posteriorly pectinated, below serrated. Operculum armed with two spines. Suborbital bones entire. Dorsal fins not united by the membrane; the anterior with nine spines. Anal fin furnished with three spines and from eleven to fourteen branched rays.

Subgenus ROCCUS *Gill*.

Body elongated and subfusiform. Teeth on the base of the tongue arranged in longitudinal patches.

The only known species is the common "rock fish" or "striped bass" of the Americans; it dwells in the sea, and ascends the fresh water streams to spawn.

Type. *Roccus lineatus Gill*.

*Syn.* *Labrax lineatus Cuv. et Val.*

Subgenus LEPIBEMA *Gill*.

Body oblong-ovate and compressed. Teeth crowded at the base in a single oval patch.

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Only one species of this subgenus is known; it is found in the rivers and lakes of the northern and central parts of the North American continent.

Type. *Roccus chrysops* Gill.

*Syn.* *Labrax multilineatus* Cuv. et Val.

Genus MORONE Gill.

*Morone* sp. *Mitchill*.

*Morone* Gill, Proceedings of Academy of Natural Sciences of Philada., 1860, p. 111.

Body oblong-ovate, compressed, slightly gibbous at the commencement of the dorsal fin. Head conical in profile, entirely covered with ctenoid scales. Tongue provided only with a marginal band of villiform teeth. Preoperculum pectinated behind and below. Operculum armed with two spines. Suborbital bones entire. Dorsal fins joined at their base by the slightly elevated membrane; first provided with nine spines. Anal fin with three spines and from seven to eleven branched rays.

Two species are known, both of which are peculiar to North America and the neighboring islands.

Type. *Morone Americana* Gill.

*Syn.* *Labrax Americanus* Holbrook.

Genus LATEOLABRAX Bleeker.

*Labrax* sp. Cuv. et Val.

*Perca-Labrax* sp. *Temminck et Schlegel*.

*Lateolabrax* *Bleeker*.

*Percalabrax* *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. i. p. 70, 1859.

Body elongated and subfusiform. Head conical in profile, covered with ctenoid scales. Preoperculum serrated behind, armed below with teeth recurved forwards. Operculum with two spines. Suborbital bones entire. Dorsal fins entirely separated; the anterior with eleven spines. Anal fin sustained by three spines and eight rays.

The tongue is smooth, but the interbranchial isthmus has small areas of villiform teeth.

A single species is found in the seas on the southern and south-eastern coasts of Asia and the neighboring archipelagoes.

Type. *Lateolabrax Japonicus* *Bleeker*.

*Syn.* *Labrax Japonicus* Cuv. et Val.

b. \* \*

Jaws, vomer and palate furnished with granular teeth.

Genus PSAMMOPERCA Richardson.

*Labrax* sp. Cuv. et Val.

*Psammoperca* *Richardson*, Voyage of the Erebus and Terror, Fishes, p. 116.

Body oblong-ovate, compressed. Head conical in profile. Preoperculum with the anterior margin concealed; the posterior serrated, the inferior edentulous, and armed at its angle with a strong horizontal spine. Suborbital bones entire. Dorsal fins connected at the base; the anterior with eight spines. Anal fin shorter than the second dorsal, with three spines and nine rays.

One species is known; it is an inhabitant of the Indian and Australian Seas.

Type. *Psammoperca waigiensis* *Bleeker*.

*Syn.* *Labrax waigiensis* Cuv. et Val.

Genus HYOPTERUS Gill.

*Psammoperca* sp. *Günther*, Catalogue of the Acanthopterygian Fish, &c., vol. i. p. 69.

Body ovate and compressed. Head conical in profile. Preoperculum serrated behind, entire below, and armed at its angle with a large horizontal spine. Operculum with its posterior angle subrotundate. Suborbital bones serrated. Anterior dorsal with eight spines, the third of which is elongated. Anal fin longer than the second dorsal, and furnished with three spines and about thirteen rays.

Type. *Hypopterus macropterus* Gill.

*Syn.* *Psammoperca macropterus* Günther.

b. \* \* \*

Villiform teeth on the jaws, vomer and palate; none on the tongue.

#### Genus PERCICHTHYS Girard.

*Perca* sp. *Cuv. et Val., Jenyns.*

*Percichthys* sp. *Girard*, Proceedings of Academy of Natural Sciences of Phiada., vol. vi. p. 197, 1854.

Body and caudal peduncle elongated. Head conical in profile, with the snout obtusely rounded or convex. Preoperculum serrated behind, armed below with teeth directed forwards. Operculum armed with a single spine. Preorbital bones scarcely serrated. Dorsal fins connected at the base by an elevated membrane; anterior with nine spines. Anal fin armed with three spines. Branchiostegal membrane on each side with seven rays.

This genus is composed of species peculiar to the fresh water streams of the temperate transandean and the southern parts of South America.

Type. *Percichthys chilensis* Girard.

#### Genus PERCOSOMA Gill.

*Percichthys* sp. *Girard, Günther.*

Body elongated, but with the caudal peduncle quite short. Head conic in profile, with the snout obtusely rounded. Lower jaw and suborbital bones cavernous. Preoperculum serrated behind, armed below with recurved teeth. Operculum armed with one spine. Dorsal fins joined at the base by the elevated membrane; anterior with nine or ten spines. Anal fin armed with three spines.

The branchiostegal membrane appears to have only six rays on each side.

A single species is known to inhabit the fresh water streams of Chili.

Type. *Percosoma melanops* Gill.

*Syn.* *Percichthys melanops* Girard.

#### Genus DEUTEROPTERUS Gill.

*Perca* sp. *Cuv. et Val.*

*Percichthys* sp. *Günther.*

Body elongated. Head conical in profile. Preoperculum finely dentated behind and beneath. Operculum terminating in a spine, above which a lobe is present. Suborbital bone serrated. The anterior dorsal fin furnished with nine spines; the second long, with a spine and about seventeen rays. Anal fin with three spines and about ten branched rays.

Only one species of the genus is known; its habitat is unknown.

Type. *Deuteropterus marginatus* Gill.

*Syn.* *Perca marginata* *Cuv. et Val.*

b. \* \* \*

Head entirely covered with scales. Preoperculum mostly entire. Anterior dorsal with about six rays.

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## Genus LIOPROPOMA Gill.

*Perca* sp. *Poey*, *Memorias sobre la Historia Natural de la isla de Cuba*, vol. ii.

Body slender and subfusiform. Head elongated, conic in profile and anteriorly acute. Preoperculum entire. Operculum armed with a strong spine. Scales covering the whole head and the bases of the vertical fins. Dorsal fins connected at their bases; the anterior with six spines, the middle of which are longest; the second armed with three spines regularly increasing in length. Anal fin with three spines; the fin increasing in height posteriorly. Caudal fin emarginate. Lateral line anteriorly strongly curved.

A single species is found in the island of Cuba.

Type. *Liopropoma aberrans* Gill.

*Syn.* *Perca aberrans* *Poey*, *Memorias sobre la Historia Natural de la isla de Cuba*, vol. ii. p. 125, pl. 12, figs. 2, 3.

## B.

Pseudobranchiæ absent or rudimentary. Tongue smooth. Teeth villiform.

## Genus LATES Cuv.

*Perca* sp. *Gmelin*.

*Centropomus* sp. *Lacepede*.

*Lates* Cuv., *Règne Animal*, ed. i. vol. ii.

Body oblong-ovate and compressed. Head conical in profile. Preoperculum serrated behind, dentated below and armed at its angle with a large horizontal spine. Operculum with one spine. Suborbital bone serrated. Dorsal fins scarcely joined at the base; the anterior furnished with seven or eight spines. Anal fin with three spines and about eight or nine branched rays.

The species of *Lates* have been only found as yet in Egypt and the rivers of the East Indies and China.

Type. *Lates niloticus* Cuv.

## Genus CNIDON Müller and Troschel.

*Cnidon* Müller and Troschel, *Horæ Ichthyologicæ*, vol. i. p. 21.

Body elongated. Head conical in profile. Preoperculum serrated behind, entire below and armed at the angle with a strong horizontal spine. Operculum spinous. Suborbital bone nearly entire. Dorsal fins two; the anterior with seven spines, the second provided with a spine and about thirteen branched rays. Anal fin with three spines and about nine branched rays.

The only species has been discovered in the Philippine islands.

Type. *Cnidon chinensis* Müller and Troschel.

## Synopsis generum Rhyptici et affinium.

THEODORE GILL, AUCTORE.

RHYPTICUS Cuv.

*Rhypticus* Cuv. *Règne Animal*, vol. ii.

*Anthias* sp. *Bloch*. *Systema Ichthyologicæ*, *Schneid.* ed.

Corpus oblongum, compressum, antice altius. Preoperculum rotundatum, postice spinis crassis duabus armatum; operculum triaculeatum. Pinna dorsalis longa, spinis duabus vel tribus portioni posteriori membrana conjunctis. Pinna analis spinis carens, vel spina minuta prædita. Pinna caudalis rotundata.

## I. RHYPTICUS SAPONACEUS Cuv.

Jabonsillo *Parra*, *Descripcion de deferentes Prezas de Historia Natural*, p. 51, pl. 24, fig. 2, 1787.

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*Anthias saponaceus* Bloch, *Systema Ichthyologiæ*, *Schneid.* ed. p. 310.

Le Savonier, commun } *Cuv. and Val.*, *Hist. Nat. des Poissons*, vol. iii. p. 63.

*Rypticus saponaceus* }  
*Rypticus saponaceus* *Storer*, *Synopsis of Fishes of North America*, p. 37; ib. in  
*Memoirs of American Academy*, vol. ii.

*Rhypticus saponaceus* *Günther*, *Catalogue of Acanthopterygian Fishes, &c.*, p. 172.

Habitat in mare Caribbeo.

## II. RHYPTICUS ARENATUS *Cuv. and Val.*

*Rypticus arenatus* *Cuv. and Val.*, *Hist. Nat. des Poissons*, vol. iii. p. 65, pl. xlv.

*Rhypticus arenatus* *Günther*, *Catalogue of Acanthopterygian Fishes, &c.*, p. 173.

Habitat littore Braziliario; *Cuv. and Val.* Insulis Jamaica et Trinitate; *Günther*.

## III. RHYPTICUS SUBBIFRENATUS Gill.

Caput longitudinis totii 28—100; cauda quintam formans. Altitudo corporis longitudinis 22—100 æquans. Color florescente-fuscus, maculis remotis nigris ornatus, caput macularum seriem duarum pictum; series una maculis quatuor, a orbita ad operculi membranam spiniformam currenti; alia maculis minoribus tribus, a oculi angulo externo-superiori ad suprascapularo currenti.

D. iii. 23. A. 15. P. 16. V. i. 5.

Habitat ad insulam Sancti Thomasi in mare Caribbeo. A. H. Rüse.

## IV. RHYPTICUS NIGRIFINNIS Gill.

Caput longitudine longitudinis quartam superans, altitudo corporis longitudinis quintam superans (=21—100.) Pinna caudalis non longitudinis quintam formans (=19—100.) Color purpureo-fuscus, immaculatus, pinnis nigro marginatis.

D. ii. 27. A. 16. P. 14. V. i. 5.

Habitat ad "Panama," Rev. I. Rowell.

## PROMICROPTERUS Gill.

*Rypticus* sp. *Holbrook*, *Ichthyology of South Carolina*, p. 39.

Corpus oblongum, valde dorso arcuatum. Preoperculum rotundatum, spinis duabus armatum. Operculum triaculeatum. Pinnæ dorsales disjunctæ, anteriori, spinis duabus a portione radiosa remotis. Pinna analis spinis carens. Pinna caudalis rotundata.

## I. PROMICROPTERUS MACULATUS Gill.

*Rypticus maculatus* *Holbrook*, *Ichthyology of South Carolina*, p. 39, pl. vi. fig. 2.

*Rhypticus maculatus* *Günther*, *Catalogue of Acanthopterygian Fishes, &c.*, p. 173.

Habitat Carolina Meridionalis littore, *Holbrook*!

## SMECTICUS Val.

*Smecticus* *Val.*, *Voyage de la Venus, Poissons*, p. 305.

*Rypticus* sp. *Val.*, olim; *Günther*.

Corpus oblongum. Preoperculum rotundatum, postice spinis duabus armatum; operculum triaculeatum. Pinna dorsalis spinis decem armata, spinis tribus anterioribus validioribus. Pinna analis spinis duabus prædita.

## I. SMECTICUS BICOLOR Val.

*Rypticus bicolor* *Valenciennes*, *Voyage de la Venus, Poissons*, pl. ii. fig. 2.

*Smecticus bicolor* *Valenciennes*, *Voyage de la Venus, Poissons* (text), p. 307.

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*Rhypticus bicolor* Günther, Catalogue of Acanthopterygian Fishes, &c., p. 173.

Color corpore capiteque rubens, albida marmoratus, pinnis niger.

Habitat ad insulas "Gallapagos."

DERMATOLEPIS Gill.

Corpus oblongo-ovatum, antice altius, compressum. Caput magnitudine modicum, compressum; e visu laterali breviter conicum. Os modicum, obliquum. Dentes cardiformes in maxillis, vomere et ossibus palatinis. Preoperculum subangulatum, integrum. Operculum triaculeatum. Pinna dorsalis longa, supra pinnarum pectoralium bases incipiens; portio spinosa longior, spinis undecim armata, spinis posterioribus brevibus, subæqualibus, portio posterior altior, in medio altissimus. Pinna analis spinis tribus et radiis novem vel decem pradita. Pinna caudalis truncata.

DERMATOLEPIS PUNCTATUS Gill.

Caput longitudinis totii quartam formans, corporis altitudine brevius. Color purpureo-fuscus vel purpurens, capite bene nigro maculatus, corpore maculis distantioribus et obscurioribus. Pinna caudalis albo-fusco maculata et marginata.

D. xi. 20. A. iii. 9. P. 18. V. i. 5.

Longitudo cerciter bipedalis.

Habitat ad Promontorium "St. Lucas," J. Xantus!

Descriptions of New Species of SCHIZOSTOMA, ANCULOSA and LITHASIA.

BY ISAAC LEA.

*SCHIZOSTOMA SPILLMANI*.—Testâ striatâ, subcylindraceâ, subcrassâ, luteo-fuscâ, imperforatâ; spirâ obtusâ, conoideâ; suturis impressis; anfractibus senis, valdè vittatis, planulatis, ultimo grandi; fissurâ obliquâ subbrevice; aperturâ grandi, ovatâ, intus vittatâ, ad basim obtusè angulatâ; columellâ albâ, supernè incrassatâ; labro-acuto sinuatoque.

*Hab.*—Coosa River, Alabama. Dr. Showalter.

*ANCULOSA TURBINATA*.—Testâ lævi, subrotundâ, crassâ, ponderosâ, tenebroso-corneâ, trivittatâ; spirâ obtusâ, vix exertâ; suturis valdè impressis; anfractibus quaternis, ultimo pergrandi; aperturâ magnâ, ovatâ, intus albidâ, trivittatâ, ad basim recurvatâ; columellâ incurvâ, impressâ; labro acuto, expanso, sinuato.

*Hab.*—North Alabama. Prof. M. Tuomey and Dr. Lewis. Tuscaloosa, Dr. Budd.

*ANCULOSA LEWISH*.—Testâ lævi, ellipticâ, subcrassâ subinflatâ, luteo-corneâ; spinâ obtusâ, vix exertâ, acuminatâ; suturis vix impressis; anfractibus quinis, ultimo pergrandi; aperturâ magnâ, regulariter ovatâ, intus albidâ; collumellâ incurvâ, supernè et infernè paulisper incrassatâ; labro acuto, subexpanso, paulisper sinuato.

*Hab.*—Tennessee. James Lewis, M. D.

*ANCULOSA COOSAENSIS*.—Testâ lævi, obtuso-conicâ, crassâ, tenebroso-corneâ, valdè vittatâ; spirâ exertâ, ad apicem obtusâ; suturis valdè impressis; anfractibus quaternis. infernè suturis valdè constrictis, ultimo magno; aperturâ rotundatâ, albidâ, intus valdè vittatâ; columellâ incrassatâ, iucurvâ, tenebroso-purpureâ; labro acuto, expanso.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

*LITHASIA FUSIFORMIS*.—Testâ sulcatâ, fusiformi, subtenui, rufo-fuscâ, quadro-vittatâ; spirâ conoideâ; suturis irregulariter impressis; anfractibus senis, ultimo magno et paulisper inflato; aperturâ elongato-rhomboidè, intus albidâ,

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quadro-vittatâ, ad basim canaliculatâ et recurvatâ; cœlumellâ sigmoideâ, supernè incrassatâ; labro subconstricto, margine acuto.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

LITHASIA IMPERIALIS.—Testâ tuberculatâ, fusiformi, subcrassâ, tenebroso-corneâ; spirâ elevatâ, conoideâ; suturis irregulariter et valdè impressis; anfractibus senis, ultimo subgrandi, supernè irregulariter tuberculatis, subinflatis; aperturâ parviusculâ, elongato-rhomboidêâ, intus albidâ, fuscis capillaribus instructis, ad basim canaliculatâ et recurvatâ; columellâ sigmoideâ, supernè paulisper incrassatâ; labro subexpanso, margine acuto.

*Hab.*—North Alabama. Prof. Tuomey.

LITHASIA TUOMEYI.—Testâ tuberculatâ, valdè inflatâ, subcrassâ, tenebroso-corneâ; spirâ obtuso-conoideâ; suturis impressis; anfractibus quinis, ultimo grandi, infrâ suturis obliquè tuberculatis; aperturâ magnâ, rhomboidêâ, intus albidâ, obsoletè vittatâ, ad basim canaliculatâ; columellâ valdè incurvatâ, supernè et infernè incrassatâ; labro expanso, margine acuto.

*Hab.*—North Alabama. Prof. M. Tuomey.

LITHASIA SUBGLOBOSA.—Testâ tuberculatâ, subglobosâ, crassâ, luteo-corneâ, bivittatâ; spirâ vix exertâ; suturis impressis; anfractibus quinibus, ultimo grandissimo, apud humeris tuberculatis; aperturâ magnâ, rhomboidêâ, intus albâ, bivittatâ, ad basim canaliculatâ; columellâ valdè incurvatâ, superuè et infernè valdè incrassatâ; labro expanso, margine acuto.

*Hab.*—Tennessee. Prof. G. Troost.

LITHASIA DILATATA.—Testâ lævi, subglobosâ, subcrassâ, glauco-virentè, infrâ suturis luteolâ, obsoletè vittatâ; spirâ obtusè conoideâ; suturis irregulariter impressis; anfractibus quinibus, ultimo magno et ventricoso; aperturâ grandî, subrhomboidêâ, intus fusciscente, ad basim angulatâ; columellâ infernè et supernè incrassatâ, incurvâ; labro acuto et valdè dilatatâ.

*Hab.*—Tennessee. Prof. G. Troost.

#### Description of a new species of *NERITINA*, from Coosa River, Alabama.

BY ISAAC LEA.

*NERITINA SHOWALTERII*.—Testâ lævi, rotundatâ, diaphanâ, luteo-corneâ; spirâ valdè depressâ; suturis leviter impressis; anfractibus trinibus, inflatis; aperturâ semirotondâ; labio dilatato, albo, incrassato, edentulo et incurvato; labro dilatato, tenui, margine acuto.

OPERCULUM ———.

*Hab.*—Coosa River, ten miles above Fort William, Shelby Co., Alabama. E. R. Showalter, M. D.

*Remarks.*—The discovery of this shell by Dr. Showalter marks the first notice of the genus *Neritina* being observed in our fresh waters. His very close observation and active investigation of the waters of central and northern Alabama, have enabled him to lay the naturalists of this country under many obligations by new discoveries, and this is certainly one of much importance. We now see for the first time that this genus, which is common in Europe, Africa, Asia, South America and the West Indies, also inhabits our southern fresh waters. I have great pleasure in naming the species after the discoverer.

This species is not closely allied to any which has come under my notice. It is more rotund than usual, has a clear horn-colored epidermis, smooth and shining; the substance of the shell so thin as to permit the column to be visible through it.

It is to be regretted that among the four specimens sent to me by Dr. Showalter, neither had an operculum. The soft parts of the animal have not yet been observed.

1861.]

Descriptions of two new species of ANODONTÆ, from Arctic America.

BY ISAAC LEA.

ANODONTA KENNICOTTII.—Testâ lævi, ellipticâ subinflatâ, inæquilaterali, posticè obtusè biangulatâ, anticè rotundâ; valvulis subtenuibus; natibus prominentibus, acuminatis, ad apices granulatis; epidermide pallido-luteâ usque tenebroso-fuscâ, eradiatâ; margaritâ cæruleo-albâ et iridescente.

*Hab.*—Great Slave Lake at Fort Rae, and north end of Lake Winnipeg, Arctic America. R. Kennicott.

ANODONTA SIMPSONIANA.—Testâ lævi, ellipticâ, subcompressâ, elongato-lenticulari, posticè obtusè angulatâ, anticè rotundâ; valvulis tenuibus; natibus prominulis, ad apices undulatis; epidermide tenebroso-fuscâ, eradiatâ; margaritâ cæruleo-albâ et iridescente.

*Hab.*—Fort Rae, Great Slave Lake, Arctic America. R. Kennicott.

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March 5th.

MR. LEA, President, in the Chair.

Forty-three members present.

The following papers were presented for publication:

“Descriptions of twelve new species of *Uniones* from Alabama, by Isaac Lea.”

“Remarks on a species of *Osmerus*, taken in the Schuylkill, below Fairmount dam, by Thaddeus Norris.”

And were referred to Committees.

Mr. Lea read extracts from a letter from Dr. Showalter, Uniontown, Alabama, in which he expresses a belief that the genus *Schizostoma* is found only in the Coosa River.

The deaths of Dr. Samuel Moore, a member, at Philadelphia, on the 18th of February, and of Prof. F. Tiedemann, of Heidelberg, a correspondent of the Academy, were announced.

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March 12th.

MR. LEA, President, in the Chair.

Forty-seven members present.

A paper was presented for publication entitled

“Notes on new and rarer species of *Diatomacæe* of the United States, by Francis W. Lewis, M. D.,” and was referred to a Committee.

Dr. Stewardson read extracts from a letter from Prof. Wyman, of Cambridge, dated Feb. 24, 1861, in relation to the habits of *Anableps*, which, swimming as it usually does upon the surface of the water, and sometimes leaving that element entirely, is enabled, by the peculiar structure of its eyes, to see as well in air as water, the upper half of the eye being especially adapted to receive the rays of light from the atmosphere, the lower half, from the water.

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March 19th.

MR. LEA, President, in the Chair.

Forty-five members present.

Copies of the Proceedings for January and February were laid on the table.

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Mr. Lea read portions of a letter from Dr. Lewis, of Mohawk, N. Y., in relation to the habits and growth of Unionidæ.

In the letter read, Dr. Lewis observes that there are excellent reasons for believing that the dark lines upon the exterior of the Uniones, usually supposed to mark the annual stages of growth, are really year marks, and in proof-adduces his observation upon shells found in the Erie canal near Mohawk. This canal, from the 1st of April until the close of navigation, has a depth of from 5 to 7 feet; when closed by ice, this level is reduced so that the mud at the bottom is frozen to the depth of from 4 to 10 inches. In early spring, the water is drawn down for repairs, and the mud exposed. During summer, the canal is richly supplied with materials for the growth both of the shell and soft-parts of the Molluscs. Thus in summer these Molluscs grow rapidly, whilst in winter there must be a period of repose, during which development is partially suspended, partly because there is less food, but more certainly because the Uniones burrow deeply in the mud to be beyond the reach of frost. "That they do burrow, I know," says Dr. Lewis, by the following facts. In one portion of the canal, several years ago, I found a considerable depth of frozen mud enclosing Uniones, Margaritanæ and Anodontæ—all dead. After this mud was softened by the sun, great numbers of those Molluscs made their way to the surface from below. Again, in certain portions of the canal, where the bottom was being excavated to the depth of 12 to 18 inches, early in spring, last year, Uniones were turned up from the lowest depths, while only very few had yet made their appearance at the surface.

A certain portion of the canal, which some 7 or 8 years ago had been completed for about 8 or 9 years, then produced shells in which none of the specimens I could find there presented a greater number of *year marks* than the period would lead us to expect, if those marks be really year marks. I distinctly recollect having counted the year marks of numerous specimens at the time I speak of, with the fact before me that the shells *could not* have an age greater than 8 or 9 years."

In regard to the age at which various species of Naiades become capable of reproducing their species, Dr. Lewis "has noticed that no ova are discoverable in some species until after they have attained two, three or four year marks."

He thinks "Anodontæ mature earlier than Margaritanæ, while these latter mature earlier than Uniones proper."

In reference to the study of the development of the Unio from its embryonic form, he makes the following suggestions:—"I would isolate species from each other in shallow cisterns of considerable area, permitting a small current of water to enter the cisterns, so as not to agitate the stratum of mud at the bottom, and provide a strainer of cloth at the point where the waste water is permitted to escape, so as to retain on its *inclined surface* whatever minute forms might be floated there. Many germs, no doubt, would thus be easily accessible, without any confusion of species, and by making daily examinations of the deposits on the strainer, the development of species could be studied up to that point when the true character of the Mollusc begins to be apparent."

His efforts to transplant the Unio radiatus from the lakes to the Erie canal have been unsuccessful, but in the course of them, he observed "that there is not a uniformity either in form or color in different individuals. The appendages of the syphons, as well as I am able to state from memory, do not seem to present the same appearances in detail, in all individuals. I think, however, that the variations in appearance may be ascribed to some habit of the animal—or may relate to its momentary condition. Sex may also have something to do with it."

In a postscript he states that he is inclined to think that the marks observable on Paludinæ are *year marks*. Judging by these and the examination of the soft-parts, Paludinæ, he says, begin to bear young about the third or fourth year. When they begin to bear young, two, three, four or five young are the first pro-1861.]

geny. The size of the young in the first progeny is not different from the size of the young produced by a full grown adult, bearing from 16 to 25 young at one gestation. The number of young, therefore, produced by an individual, in Paludina, corresponds to the size of the parent."

The deaths of Mr. David March Warren, on the 10th inst., and Dr. Richard Clements, on the 13th inst., members of the Academy, were announced.

March 26th.

MR. LEA, President, in the Chair.

Thirty-five members present.

On report of the respective Committees, the following papers were ordered to be published in the Proceedings :

Remarks on a species of *OSMERUS* taken in the Schuylkill, below  
Fairmount Dam.

BY THAD. NORRIS.

*Form.*—Elliptical, elongated ; section oval ; breadth compared with its length (exclusive of caudal) as 2 to 11, and head from tip of lower jaw to posterior angle of opercle as 5 to 22.

Lower jaw projecting, with an upward curve ; scales on all the gill covers, largest on preopercle ; five large recurved teeth on the tongue, the largest on the extreme point ; two of the same kind on the front of the upper jaw : no teeth on the vomer, but a patch of small ones on the palatine bones and maxillaries.

*Color.*—Silvery steel above, with light greenish reflections ; a distinct streak of bright roseate purple extending immediately above and along the lateral line ; sides silvery ; belly brilliantly white. Branchial rays 8.—D 11, C 20 ; P 11 ; V 8, A 15.—The second dorsal has about twenty minute but distinct cartilaginous rays ; tail forked, upper lobe slightly longest.

The points of difference between this and the *O. viridescens* are the more Southern habitat of the new species, its smaller and more uniform size, and the distinct roseate purple of the streak above the lateral line. *O. viridescens*, (the northern smelt,) attains the length of 12 inches. I have seen the new species here described in quantities at New Brunswick, New Jersey, but never exceeding 6½ inches exclusive of caudal.

Storer enumerates 14 rays in the pectorals of *O. viridescens*, but on a recent examination of that species I found only 11, as in the new species, and that the fin rays of both are identical.

There are several circumstances of interest connected with this little fish. It is the smallest of all the Salmonidæ, except the two genera of *Scopulus* and *Mallotus*. It is the only fish of the Salmon family besides the brook trout found in our waters, and the only species of *Anadromus salmonidæ* that visits the Delaware and its tributaries. Whether this fish enters any fresh rivers south of Cape Henlopen is a matter of conjecture, but I have no doubt, if properly sought for, it may be found very early in the spring, in many streams falling into the Delaware, particularly in rapids or near the falls of a dam which obstructs the upward flow of the tide.

It appears to visit our waters only for the purpose of spawning, and is found at the falls below Fairmount dam for a few days in February or early in March. In those I examined a few days since, I found the milt partly discharged from the male and exuding in a semi-fluid state from the vent. Many of the females had cast their spawn, in others it was partially dis-

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charged, and the ova were found sticking to the sides of the fish as they lay in a heap.

I have been told that these fish can be taken occasionally in February along the wharves and in the docks of the Delaware with a cast net. They are taken with cast and scoop nets at Fairmount dam. They are common and abundant at New Brunswick, New Jersey, on the Raritan, and it is said also in the Passaic, though during some winters they even there are comparatively scarce.

It is evident from the size, shape and arrangement of the teeth, that this fish is extremely predatory, and in that respect more closely allied to the true salmon than either of the genera of *Coregonus* or *Thymallus*.

In the examination of this fish I have ascertained a fact which is also worthy of note: it is, that the second dorsal or adipose fin (which in this fish is transparent) has about twenty minute cartilaginous rays; they are quite distinct, and the question arises, are there not rays in the adipose fin of all the *Salmonidæ*, though it may be covered with thick skin or fat, concealing the rays. The adipose fin was given for use by the Creator, and not as a useless appendage, and without the rays how else could it be contracted or expanded, or moved from one side to the other? It may be said that they are merely cartilaginous, but so are many of the rays, especially near the ends or border of the fins. Dr. Bridges could not discover these rays on examining this fish, as it had been dipped in alcohol, and the fin rendered opaque.

#### Descriptions of twelve new species of UNIONES, from Alabama.

BY ISAAC LEA.

*UNIO NEGATUS*.—Testâ sulcatâ, subtriangulari, compressâ, ad latere planulatâ, posticè obtusè angulatâ, anticè rotundâ, subæquilaterali; valvulis subcrassis, anticè crassioribus; natibus subprominentibus, acuminatis, ad apices corrugatis; epidermide rufo-fuscâ, obsoletè radiatâ; dentibus cardinalibus subgrandibus, striatis crenulaticque; lateralibus subcrassis, sublongis subrectisque; margaritâ vel albâ vel rosacè et iridescente.

*Hab*.—Big Prairie Creek, Alabama. E. R. Showalter, M. D. And Columbus, Mississippi. W. Spillman, M. D.

*UNIO GLANDACEUS*.—Testâ lævi, subtriangulari, inflatâ, inæquilaterali, posticè subtriangulatâ, anticè rotundatâ; valvulis crassis, anticè crassioribus; natibus prominulis, crassis; epidermide glandacèa, rugosâ, eradiatâ; dentibus cardinalibus magnis, valdè sulcatis, erectis; lateralibus curtis, crassis, corrugatis, obliquis subrectisque; margaritâ albâ et iridescente.

*Hab*.—Cahawba River, Alabama. E. R. Showalter, M. D.

*UNIO INSTRUCTUS*.—Testâ lævi, subtriangulari, subcompressâ, inæquilaterali, posticè subbiangulatâ, anticè rotundâ; valvulis crassiusculis, anticè crassioribus; natibus prominentibus, ad apices rugoso undulatis; epidermide melleâ, exillissimè striatâ, eradiatâ; dentibus cardinalibus parviusculis, striatis crenulaticque; lateralibus subcurtis, striatis, obliquis subrectisque; margaritâ argenteâ et iridescente.

*Hab*.—Cahawba River, Alabama. E. R. Showalter, M. D.

*UNIO TRINACRUS*.—Testâ lævi, triangulari, ad umbones tumidâ, inæquilaterali, posticè angulatâ, anticè obliquè rotundatâ; valvulis crassis, anticè et posticè crassioribus; natibus prominentibus, tumidis; epidermide fusco-virente, obsoletè radiatâ, striatâ, dentibus cardinalibus parviusculis, depressis striaticque; lateralibus subcurtis, percrassis, obliquis, corrugatis rectisque; margaritâ argenteâ et iridescente.

*Hab*.—Coosa River, Alabama. E. R. Showalter, M. D.

*UNIO STABILIS*.—Testâ lævi, triangulari, valdè tumidâ, valdè inæquilaterali, 1861.]

posticè subbiangulari, anticè rotundatâ, valvulis percrassis, anticè crassioribus; natibus valdè prominentibus, tumidis, solidissimis, incurvis; epidermide pallido-melleâ, eradiatâ, infernè striatâ; dentibus cardinalibus crassiusculis, compressis, erectis striatisque; lateralibus crassis, curtis, obliquis, rectis corrugatisque; margaritâ albâ et iridescente.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

**UNIO CONSANGUINEUS.**—Testâ lævi, valdè obliquâ, anticè tumidâ et truncatâ, posticè compressâ et obtusè angulatâ; valvulis crassis, anticè paulisper crassioribus, natibus tumidis, elevatis, incurvis terminalibusque; epidermide luteo-castaneâ, obsoletè radiatâ, transversè vittatâ; dentibus cardinalibus subgrandibus, striatis subcompressisque; lateralibus longis, crassis, corrugatis subcurvisque; margaritâ argenteâ et iridescente.

*Hab.*—Etowah River. Rev. G. White. Oostenaula River, Georgia. Bishop Elliott. And Cahawba River, Alabama. E. R. Showalter, M. D.

**UNIO CREBRIVITTATUS.**—Testâ lævi, valdè obliquâ, anticè tumidâ et truncatâ, posticè compressâ rotundâque; valvulis crassis, anticè crassioribus; natibus tumidis, elevatis, incurvis terminalibusque; epidermide tenebroso fuscâ, transversè et crebrè vittatâ; dentibus cardinalibus subgrandibus, striatis corrugatisque; lateralibus longis, crassis, corrugatis subcurvisque; margaritâ argenteâ et iridescente.

*Hab.*—Coosawattee River, Alabama. Bishop Elliott.

**UNIO INTERVENTUS.**—Testâ lævi, subobliquâ, subcompressâ, inæquilaterali, posticè rotundatâ, anticè rotundâ; valvulis crassiusculis, anticè crassioribus; natibus elevatis; epidermide luteo-corneâ, supernè radiatâ, infernè striatâ, ad umbones micanti; dentibus cardinalibus parvis, pyramidatis striatisque; lateralibus subcurtis, crassis, subobliquis subcurvisque; margaritâ argenteâ et valdè iridescente.

*Hab.*—Cahawba River, Alabama. E. R. Showalter, M. D.

**UNIO PALLIDOFULVUS.**—Testâ lævi, obliquâ, tumidâ, valdè inæquilaterali, posticè rotundatâ, anticè rotundâ; valvulis crassis, anticè crassioribus; natibus elevatis, subincurvis; epidermide pallido-fulvâ, maculatâ, infernè striatâ; dentibus cardinalibus parvis, pyramidatis striatisque; lateralibus subcurtis, crassis, subobliquis; margaritâ argenteâ et iridescente.

*Hab.*—Cahawba River, Alabama. E. R. Showalter, M. D.

**UNIO PORPHYREUS.**—Testâ lævi, ellipticâ, ventricosâ, valdè inæquilaterali, posticè obtusè biangulatâ, anticè rotundatâ; valvulis subcrassis, anticè crassioribus; natibus prominulis; epidermide rufo-fuscescente, micanti, eradiatâ; dentibus cardinalibus crassiusculis, corrugatis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, subcrassis, corrugatis subrectisque; margaritâ saturate-purpureâ et valdè iridescente.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

**UNIO PERPASTUS.**—Testâ lævi, ellipticâ, valdè ventricosâ, valdè inæquilaterali, posticè obtusè biangulatâ, anticè obliquè rotundatâ; valvulis crassiusculis, anticè paulisper crassioribus; natibus subprominentibus, inflatis; epidermide luteo-fuscescente, supernè micanti, infernè striatâ, eradiatâ; dentibus cardinalibus parviusculis, erectis, conicis corrugatisque; lateralibus sublongis, lamellatis, corrugatis subcurvisque; margaritâ albâ et iridescente.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

**UNIO GRANULATIS.**—Testâ plicatâ, ellipticâ, subinflatâ, valdè inæquilaterali, posticè obtusè angulatâ, anticè rotundâ; valvulis subtenuibus, anticè paulisper crassioribus, natibus prominulis, ad apices undato-granulatis; epidermide tenebroso-olivâ, eradiatâ, transversè striatâ; dentibus cardinalibus parvis, compressis, obliquis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, acicularis, tenuis subrectisque; margaritâ purpurascete et valdè iridescente.

*Hab.*—Big Prairie Creek, Alabama. E. R. Showalter, M. D.



## Notes on new and rarer species of Diatomaceæ of the United States Sea Board.

BY F. W. LEWIS, M. D.

The present communication contains brief notices of some of the rarer and hitherto undescribed species of Diatomaceæ of the United States Sea Board, which have fallen under my observation during the last three years, together with a list of a few of the more characteristic and generally distributed coastal species.

The forms to be described are mostly salt-water or brackish. A few species, however, known as fresh-water will be noticed where these have been found domesticated along with the marine.

I have endeavored, as far as possible, to avoid describing species unless from perfect specimens; carefully rejecting all doubtful and imperfect forms. Sources of error arising from the great variation in size, outline, and striation, and from the absence of certain and positive indications whereby the sporangial may be detected and classified with its typical variety, I have also endeavored to guard against. The want, however, of several important consulting authorities on this branch in the Academy's Library, together with the not always satisfactory character of the material furnishing the data of this paper, often consisting of muds and mixed gatherings, must be my excuse for any errors or inadvertencies which may be found in its pages.

Among those to be described will be introduced one or two doubtful forms, probably sporangial, as *Amphiprorā pulchra* Bailey, and extraordinary varieties of *Surirella ovata* and *Triceratium alternans*, both of which last are figured.

It is proposed to consider the species to be noticed in the following order:

1. "New species and sporangial forms." 2. "Rare species and species not hitherto noted as belonging to this country." 3. "Species characteristic of the American coast." 4. "Species of universal distribution."

The precise locality and nature of the gathering from which specimens have been derived will be indicated, excepting where species are of general distribution and very abundant along the coast, along with such other distinctive characters as may be necessary for the definition of new or doubtful species; and as it is not intended that the summary shall present a complete resumé of native marine species, mention of many forms known to me not referable to one or other of the above four divisions will be omitted.

It may not here be out of place to add, that the result of my limited investigations convinces me that a rich and unexplored field lies open in the United States for those whose time and attention may hereafter be directed to this branch of microscopic research, a branch, until very recently, comparatively neglected in this country. Perhaps a reason for this neglect may be found in the great interest attaching to the less laborious study of the numerous fossil diatomaceous deposits of our country, and of the new and ever varying guanos so frequently finding their way to our shores. Without any intention of undervaluing the importance of researches on fossil botany, it may yet be doubted whether results so satisfactory and important to science are likely to accrue, as when the *living* forms are the subject of study. Nothing certainly would seem so well calculated to dampen the ardor of physiological inquiry as prolonged and laborious examinations of the minute detail of the silicious skeletons of these organisms without reference had to the kind and manner of life they once invested.

As an additional argument in favor of the study of *living* species it may here be mentioned that many of the fossil forms are still to be found as *living* species on the coast, or under circumstances which prove them to have been alive at no very remote period. It is not unusual to meet with some of these in the Delaware tidal mud, and a still larger number are to be found in the blue

clay (old æstuary) deposit immediately underlying it. Among these a few of the most common are, *Eupodiscus Ralfsii*, *E. argus*, *Coscinodiscus gigas*, *C. ocul-iridis*, *C. centralis*, *Triceratium striolatum*, *T. punctatum*, *Actiniscus sirius*, &c., *Sceptroneis caduceus*, occurs living on algae at Riviere du Loup, St. Lawrence river, *Goniothecium obtusum* at Black Rock Harbor, L. I.

The important question, too, of the influence of locality on the growth and development of species no where presents itself in so interesting a point of view as in this country. The large extent of its sea board, embracing every variety of climate, the continuous chains of æstuaries and sounds along the entire line of coast, and the many rivers, large and small, traversing every kind of soil from the southern alluvial to the granite ranges of the north east, offer an unsurpassed field for the study of this influence.

Although not able to pursue the subject at this time, I cannot refrain from alluding to a fact which forces itself on the mind at an early stage of these investigations, viz.: the great distance from the sea at which marine influences continue to make themselves felt. Philadelphia is situated nearly a hundred miles from the ocean, and even at the period of spring tides at least fifteen miles above the faintest suspicion of brackish water, and yet quite a number of the diatoms in the Delaware at this point are purely marine, and a still larger number brackish. The agency of migratory fish, as the shad and low swimming sturgeon, in bringing about this result, is no doubt important, but will not serve to explain the presence of brackish and marine species in the ditches adjoining Cooper's Creek, a tributary of the Delaware, and in Fox Chase Run, some ten miles above this city, at points not within tidal range. The old æstuary bed of the Delaware (blue clay) before alluded to, was very rich in these forms, and by digging down a short distance at any part of the meadow land bordering the river, the blue clay which contains them may be exposed. An idea which naturally suggests itself under these circumstances as a solution of this paradoxical difficulty is, that possibly the telluric impression of the subjacent soil may continue to make itself felt in the development of species for a long period after the other surroundings have ceased to be favorable.

At all events it needs some other explanation than that ordinarily had recourse to viz. the hardihood of these low forms of organic life, and the agency of birds and fish to account for the permanent localization of marine species at points apparently so unsuited to their existence.

#### I. *New species and Sporangial forms.*

1. *Triceratium alternans*, *Bailey*. *Sporangial*?—This somewhat doubtful form has so few of the characters of *T. alternans*, that but for the occurrence of intermediate varieties the propriety of its reference to that species might seem questionable. The structure of the valve is distinctly cellular, in the smaller varieties indistinctly so, and that of the obtuse processes faintly punctate. The largest pustules attain the size of *T. fava* s.

*Hab.*—St. Mary's river, Ga., in scum of a salt marsh.

2. *Surirella pulchra*, n sp. F. V. Linear narrow, often somewhat twisted. V. Ovate or elliptical, alæ distinct, canaliculi numerosi, marginal inflated as in *S. fastuosa*, 6 in '001, extending for about two-fifths of the distance to centre of valve, central portion smooth circumscribed on either side by a coarsely striated arcuate band with harshly defined edges, and connected with its fellow at a short distance from the end of the valve. Immediately exterior to these bands, and separating them from the inner termination of the canaliculi throughout the entire length of the valve, is a corresponding only somewhat narrower arcuate smooth space. Length of valve '005 to '009. Pl. I. f. 1.

This very beautiful form, evidently allied to *S. fastuosa* and *S. eximia*, *Mic. Journ.*, differs from both in the greater number of its canaliculi and the presence of the striated bands. In this respect it closely resembles the species next to be described.

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*Hab.*—St. Mary's river, Ga., salt marsh and in tidal mud. Wharf at Fernandina, Florida, tidal deposit. Pier at St. Augustine, Florida. Rare.

3. *Surirella Febigerii*, n. sp. F. V. As in last described. V. Elliptical to linear ovate, sometimes broadly sphenoid, alæ inconspicuous, canaliculi 6 a 7 in '001, straight or slightly convex, linear, reaching from the margin to a striated arcuate band situated relatively to the valves as in the preceding. Interspaces of the canaliculi strongly punctate. Central portion similar in outline to that of *S. ornata*, elevated above the surface of the valve and coarsely striate. Length of valve '006 a '010. Pl. I. f. 2.

The striking similarity in outline and number of canaliculi of this to the last described species, together with the correspondence in both of the arcuate striated bands, at first led me to regard these forms as merely different aspects of the same frustule (valve); but after careful examination of several detached valves, by reversing the slides and other manipulations, I am led to conclude that they belong to different species. Both are very striking and showy forms, more particularly the last, whose strongly marked intercostal puncta, and the generally ornate character of its valve, make it a singularly beautiful microscopic object. *S. Febigerii* is pretty generally, but not abundantly, distributed along the Atlantic coast. The first specimens were detected by me two years ago in mud dredged from New London Harbor, sent me by Mr. Febiger, of Wilmington, Del., in honor of which careful and industrious observer I have named the species.

*Hab.*—New London Harbor mud, St. Mary river, mud from oysters. Wharf at Fernandina, and more recently at Cape May salt marshes, by Mr. Febiger. From its wide range of locality it will doubtless prove a common form on the coast.

4. *Surirella ovata*, Kütz, *Sporangial?* Pl. I. f. 3. This variety is not uncommon in salt marshes along the Jersey coast, although specimens of the size figured are very rare. A comparison with the typical species will show considerable points of difference, but these become less in frustules which approximate to the normal size, although never altogether lost. It is perhaps entitled to rank as a variety of *S. ovata*. Length of valve '0009 a '0050.

5. *Cymatopleura marina*, n. sp. F. V. Linear, slightly inflated ends more or less truncate. V. Lanceolate, very acute, undulations from 6 to 13. Surface of valve irregularly punctate. Length of valve '0007 a '00. Pl. I. f. 4.

This inconspicuous little form, although not yet found in quantity, occurs at various points along Long Island Sound. As far as is known to the writer it is the only marine species.

*Hab.*—On algae at New London, New Haven and Black Rock Harbors. East river (Mr. Febiger), in mud.

6. *Amphiprora conserta*, n. sp. Frustules adherent in curved bands often to the number of 12 or more. Frustule straight, membranaceous. F. V. Linear oblong, slightly dilated. Keel or ala central or subcentral, constricted, costate, spatulate at extremities. V. Lanceolate or lanceolate with produced extremities. Pl. I. f. 6.

The great variation in size, outline and general configuration of the frustules of this species, together with the fact of their being so imperfectly silicious that a boiling in weak acid either distorts or entirely destroys the specimen, renders it not improbable that this may be an early developmental form, although of what known species, if any, would be difficult to say. A smooth and very diaphanous variety of *A. paludosa* occurs in the same gathering.

The "plates" alluded to by the late Prof. Gregory (Marine Diatomaceæ of Clyde,) as characterizing *A. lepidoptera*, and others of the genus, are strongly marked in this species, and serve as a point of attachment between the various frustules. Arising from the surface of the valve at a short distance from its extremity, they are broadly convex and incline somewhat outwards.

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By the central portion of the outer aspect or margin of these plates, each frustule is united to the adjoining one on both sides, the keels or alæ of all three overlapping for about one half their breadth. A nearly perfect circle is thus often formed by a union of from 8 to 12 frustules. I am not aware of any description heretofore given of the union of the frustules of *Amphiprora* into bands or otherwise. In consequence of this arrangement, an end view of the frustule can readily be obtained.

*Hab.*—On marine algæ (ceramium) off Light House Rocks, New London, abundant. The bands of frustules are often moulded around the smaller stems of *Rhodospermeæ*.

7. *Amphiprora Nereis*, n. sp. Frustule usually twisted, hyaline, very inconspicuous. F. V. Elliptical with rounded ends, constriction of keel or alæ very deep. V. Striated, striæ from 50 a 60 in  $\cdot 001$ , extending to margin of alæ. Supplementary plates? crenulate or undulating, at the margin appearing as though perforated with small puncta. Length of valve  $\cdot 002$  a  $\cdot 0045$ .

*Hab.*—On algæ (*Dasyelegans*) from a brackish lake at Narragansett.

This beautiful and delicate little form I have found only at Narragansett. Its very small size, and faint markings make it so inconspicuous an object that a 1-12th inch is required not only to define but even to detect the balsamed specimens on a moderately crowded slide. The only indication of marking arresting the eye, is the lines of puncta or dots seen in Pl. I. f. 6. These I at first supposed were portions of the alæ, but after examining several specimens and fragments of broken valves it seems more probable to me that they form supplementary plates, arising from the alæ at or near its junction with the body of the frustule, and occupying the same plane as the former.

This *Amphiprora* most nearly resembles *A. ornata* *Bailey*, in size and markings. Many of the frustules present a good deal of the rectangularity of that species, but in other respects widely differ from it.

8. *Navicula marginata*, n. sp. F. V. Oblong, slightly constricted, with rounded ends. V. Panduriform deeply and abruptly constricted. Segments lanceolate with subacute extremities. Surface of valve very convex, striate, striæ moniliform, distinct, about 28 in  $\cdot 001$ . Margin of valve bordered by a series of numerous small and beautifully distinct arches, apparently due to the absence or depression of the outer silicious plate, 6 in  $\cdot 001$ . Length of valve  $\cdot 005$  to  $\cdot 006$ . Pl. II. f. 1.

The only two specimens of this beautiful diatom yet found by me, were derived, the one from Black Rock Harbor, (Light House Point,) on the roots of harbor grass; the other, an imperfect frustule, from the blue clay of the old Delaware estuary, (fossil). The former was a perfect frustule, and has furnished the drawings. It is very likely that this will hereafter prove a widely distributed species on the coast, from the fact of its occurrence with recent and fossil at points so remote from each other.

The characteristic ornate border and the peculiar striation serve to distinguish it from any of the panduriform species yet figured or described.

*Hab.*—Blue clay, Delaware river, (fossil). Light House Point, Black Rock Harbor. On algæ.

8. *Navicula*, n. sp.? or sporangium of *N. rhomboides*? or *N. fossilis* *Ehr.*—F. V. Linear slightly inflated. V. Lance elliptic, striate; striæ parallel, very clear and sharp, 50 a 60 in  $\cdot 001$ ; central line, together with nodules, very prominent. Length of valve  $\cdot 004$  to  $\cdot 013$ . Pl. II. f. 3.

This large hyaline species occurs in salt and brackish localities. It is found in the St. Mary's river, within two miles of the ocean, and on the Savannah river, below the city. *Triceratium favus* is found living in the same localities. In many of its characters it is nearly allied to *N. rhomboides* and *crassinervia*, more particularly to Var.  $\beta$ , of the first named, and, perhaps, notwithstanding its marine habitat, ought to be regarded as a sporangial variety of one or other of these species.

*Hab.*—Mud from oysters, St. Mary's river, Ga. Tidal mud from Savannah river. Marsh at Fernandina, Florida. Rare.

10. *Navicula Powellii*, n. sp.—V. Linear, sharply attenuated at subacute extremities, striated; striæ costate, interrupted about their middle by a blank line running from end to end of the valve; central nodule surrounded by a large lozenge-shaped blank space, reaching to the blank line as above. Length of valve  $\cdot 004$  a  $\cdot 006$ . Pl. II. f. 6.

This species is allied to *Navicula lineata* *Donkin*, Mic. Jour., in striation, but not in general characters.

*Hab.*—Black Rock Harbor, on algæ and on mud. Rare.

11. *Mastogloia angulata*, n. sp.—F. V. Oblong, truncate. V. Elliptical extremities slightly produced; loculi from 8 to 12; striæ 36 a 40 in  $\cdot 001$ , resembling those of *Pleurosigma angulatum*. Length of valve  $\cdot 0014$  a  $\cdot 0035$ . Pl. II. f. 4

This species cannot be confounded with *Mastogloia apiculata*, from which it differs in its more broadly elliptical shape, the smaller number of its loculi and the angular character of its striation. These specific characters are unvarying.

*Hab.*—On algæ, from rocks off New Rochelle, Bannister's creek. Rockaway tidal mud. Stonington Inlet, on harbor grass, along with *M. apiculata* and *M. lanceolata*. Salt marshes at Atlantic, N. Jersey. Salt marshes at Cape May. Common.

12. *Mastogloia exigua*, n. sp.—V. Lanceolate elliptic; extremities sometimes a little produced; loculi 2 to 5, (commonly trilocular,) arched on the central aspect; striæ obscure. Length of frustule  $\cdot 0005$  a  $\cdot 001$ . Pl. II. f. 5.

*Hab.*—Marsh scum of St. Sebastian river, St. Augustine, Florida. Pier at St. Augustine. Fernandina pier, coast of New Jersey.

This species occurs quite abundantly at the above localities. Its distinguishing peculiarity is the small number and curved outline of the loculi.

## II. *Rare and hitherto, in this country, unnoted species.*

1. *Cocconeis oceanica* *Ehr.*—V. Broadly elliptical, somewhat larger than the variety figured in "Bacillarien."

*Hab.*—Tidal rocks off New Rochelle, L. I. New London and Bridgeport, attached to algæ and sertularia. Common.

2. *Epithemia constricta* *W. Smith.*—*Hab.* Mud from St. Sebastian river, St. Augustine, Florida. Common. L. I. Sound.

3. *Eupodiscus Ralfsii* *W. Smith.*—*Hab.* Mud from Black Rock Harbor. Bush river, Del., Mr. Febiger. Rice field mud, Savannah. St. Mary's river, Ga. Common, but not abundant.

4. *Actinophenia splendens* *Shadbolt.*—*Hab.* Delaware river mud. St. Mary's marsh, Ga. Rare.

5. *Arachnoidiscus Ehrenbergii* *Bailey.*—*Hab.* Long Beach, San Francisco, Cal., on algæ, along with *Hyalodiscus Californicus*. Rare.

6. *Triceratium undulatum* *W. Smith.*—*Hab.* Delaware river mud. St. Mary's river, Ga., marsh. Rare.

7. *Triceratium striolatum* *Ehr.*—*Hab.* St. Mary's river, Ga. Rice field mud, Savannah.

8. *Triceratium pentacrinus* *Wallich.*—*Hab.* Rice field mud, Savannah. Dredgings off Florida. U. S. Coast Survey. St. Mary's river. Rare. The 4 and 5-sided varieties are the only ones I have met with.

9. *Campylodiscus costatus* *Ehr.*—*Hab.* Delaware river mud. Rare.

10. *Campylodiscus parvulus* *W. Smith.*—*Hab.* On marine algæ from Newport, R. I., S. Powel. New London harbor mud. St. Augustine, Florida. The valves on the American variety, as far as met with, always have the valves at right angles to each other. Rare.

11. *Campylodiscus Ralfsii* *W. Smith.*—*Hab.* Black Rock Harbor mud. Connecticut river mud. Rare.

12. *Campylodiscus Hodgsonii* *W. Smith.*—*Hab.* Mud from Savannah river. Rare.

13. *Campylodiscus spiralis* *W. Smith.*—*Hab.* Ogeechee river, Ga. Savannah river. This fresh water species obtrudes on the above localities, also on the blue clay, Delaware river.

14. *Surirella fastuosa* *Ehr.*—*Hab.* Entire coast, on algæ and on mud. Common, and presenting a great range of outline and size.

15. *Surirella craticula* *Ehr.*—*Hab.* Delaware river mud. Rice field mud, Savannah.

16. *Nitzschia bilobata* *W. Smith.*—*Hab.* Bridgeport, Conn., harbor; adherent to roots of harbor grass. Very rare.

17. *Nitzschia closterium* *W. Smith.*—*Hab.* Marshes near Port Penn, Del. On algæ at Stonington, Conn. Rare.

18. *Nitzschia spathulata* *W. Smith* = *N. hyalina* (*Gregory.*)—*Hab.* Salt marshes along the railroad at Atlantic, N. J. Salt marsh, Cape May, Mr. Febiger.

The American variety is smaller than the foreign.

19. *Nitzschia panduriformis* *Gregory.*—*Hab.* St. Mary's river, mud from oysters. Rare.

This beautiful species varies a good deal in size and somewhat in outline. The smaller specimens, but for the greater sharpness and coarseness of the striae, and the prominence of the puncta, might be confounded with the larger frustules of *Tryblionella constricta*.

20. *Nitzschia reversa* *W. Smith.*—*Hab.* St. George's Marsh, near Port Penn, Del. Marshes near Wilmington, Mr. Febiger. Rare.

21. *Nitzschia amphioxys* *W. Smith.*—*Hab.* Delaware river mud, marshes near Delaware City, Mr. Febiger.

22. *Nitzschia angularis* *W. Smith.*—*Hab.* Delaware river mud. Mud from Bannister's creek, Rockaway, L. I.

23. *Amphiprora paludosa* *W. Smith.*—*Hab.* On algæ at Stonington Inlet, L. I. Wilmington marshes, Del., Mr. Febiger. Common.

Several varieties of this species are found, in one of which the markings on the keel are entirely wanting. Atlantic salt marshes.

24. *Navicula trinodis* *W. Smith.*—*Hab.* Large rivers and brackish and fresh water marshes along the entire Atlantic coast. At Northam's Pond, brackish, Newport, R. I., Mr. Powel. Very abundant.

This species answers so fully to the description of *N. trinodis* *Smith*, that their identity can scarcely be questioned. A southern variety from St. Mary's river attains a much larger size, and the ends are often considerably produced. *N. trinodis* is a common rice field species. The common variety in this country is shewn in Pl. II. f. 6.

25. *Navicula Jennerii* *W. Smith.*—*Hab.* St. Sebastian river, St. Augustine, Florida; in mud. Rare.

26. *Navicula convexa* *W. Smith.*—*Hab.* New London harbor mud. Rare.
27. *Navicula humerosa* *Brebbison.*—*Hab.* Saguenay river, on algæ. Long Beach, N. J., on algæ. L. I. Sound, algæ. Common.
28. *Navicula Henedyi* *W. Smith.*—*Hab.* Delaware river, Kaighn's Point. Blue clay, fossil, Delaware river. New London, Conn., harbor mud.
29. *Navicula trochus* *Ehr.*—*Hab.* Blue clay, fossil, Delaware river. Very rare.
30. *Navicula truncata* *Donkin.*—*Hab.* Long Beach, N. J. New London, L. I.; algæ, &c.
31. *Navicula minutula* *W. Smith.*—*Hab.* Brackish marshes at Absecom Inlet, N. J. Cape May, salt marsh. Not uncommon.  
Differs in habitat and shape, which is more pointedly elliptic, but agrees in striation and all other respects with the figure in Smith's Synopsis.
32. *Pinnularia longa* *Gregory.*—*Hab.* Providence, Fall river, on algæ. Newport, R. I., on algæ. Rare.
33. *Pinnularia polyonca* *Brebbison.*—*Hab.* Very general along the coastal ponds and rivers. Northam's Pond, along with *Navicula trinodis*. Ogeechee and Savannah rivers, on algæ. Delaware river. On mud from Cooper's creek, N. J., and Duck creek, Del. Our native variety often attains a length of .005. The figure in *Mic. Journ.*, vol. 2, pl. iv., conveying a very poor idea of the size and general characters of *P. polyonca*, a representation of a full sized specimen will be found in Pl. II. f. 7.
34. *Pleurosigma macrum* *W. Smith.*—*Hab.* Brackish marshes at Wilmington, Del., Mr. Febiger. Rare.
35. *Pleurosigma obscurum* *W. Smith.*—*Hab.* Brackish marshes at Delaware City, Port Penn. Marshes of Delaware City, Mr. Febiger. Rare.
36. *Pleurosigma intermedium* *W. Smith.*—*Hab.* New Rochelle, on algæ. Dredged from sea at New London. Very abundant in this locality, but not elsewhere.
37. *Pleurosigma rigidum* *W. Smith.*—*Hab.* New Rochelle, on algæ; along with *Pleurosigma intermedium* at New London. Rare.
38. *Pleurosigma delicatulum* *W. Smith.*—*Hab.* Delaware river. Rare.
39. *Licmophora splendida* *Ehr.*—*Hab.* Rocks off Newport harbor, on algæ, Mr. Powel. Common.
40. *Podosphenia Baileyi*, n. sp., *Edwards.*—F. V. Broadly cuneate, truncate, sessile end often produced. V. Obovate, or suborbicular; the lower extremity prolonged into a very acute point, striated; striæ about 55 in .001.  
*Hab.*—Long Island Sound, on algæ. At Stonington. New London. Black rock, Long Beach, N. J., on algæ. Common. Pl. II. f. 8.  
This is possibly the species alluded to by Mr. Edwards, in his paper on American Diatomaceæ, *Mic. Journ.*, although in my specimens the presence of vittæ is sufficiently obvious. In this early stage the frustules are imperfectly silicious and possess short stipes, but as the growth of the individual progresses these become absorbed, until finally, as in others of the genus, they appear simply sessile.  
Since writing the above, my friend Mr. Edwards has informed me of the identity of this species with his *P. Baileyi*, (manuscript.)
41. *Gomphonema marinum.*—*Hab.* New Haven harbor mud. Bannister's creek, Rockaway mud, and New Rochelle, on algæ. Not uncommon.

42. *Eucampia zodiacus* Ehr.—*Hab.* Dredged by Mr. Powel, off rock at Newport, R. I. Rare.

43. *Rhabdonema minutum* Kützing.—*Hab.* Narragansett rock, on algæ. Newport harbor, on algæ, Mr. Powel. Stonington rocks, on algæ.

44. *Cymbosira Agardhii* Kützing.—*Hab.* Rock off New Rochelle. Stonington Inlet.

45. *Tessella interrupta* Kützing.—*Hab.* Off rocks at New Rochelle, on algæ.

46. *Amphitetras antediluviana* Ehr.—*Hab.* Mud from Black Rock Harbor, along with Var.  $\beta$ . On algæ from New Rochelle. Mud from St. Mary's river. Rice field, Savannah, mud.

47. *Biddulphia turgida*.—*Hab.* St. Mary's river, on algæ. St. Augustine's Quay, Florida.

48. *Isthmia nervosa* Kützing.—*Hab.* Rivière du Loup, St. Lawrence river, on algæ. L. I. Sound, fragments. Very rare.

49. *Bacteriastrum furcatum* Shadbolt.—*Hab.* Mud from St. Mary's river, Ga., also on algæ. St. Sebastian's river, on algæ. Fernandina, Florida. Rice field mud, Savannah river.

*Var.  $\beta$ .*—Without the bifurcate arrangement at the extremities.

50. *Bacteriastrum curvatum* Shadbolt.—*Hab.* Same localities as above. Detected by Mr. Febiger in some mud brought by me from St. Mary's river, marsh.

51. *Asterionella Bleakleyi* W. Smith.—*Hab.* St. Mary's river, on algæ. Fernandina wharf. Ogeechee canal. Savannah rice field mud, Savannah. This species occurs in greatest abundance at St. Mary's, Ga. It differs slightly from the specimens figured in *Mic. Journ.*, in the outline of the valve, which is more slender in the American variety, and also less inflated at the base. I am of opinion that the normal number of frustules is four, which may be increased to eight by subdivision, but in this latter case the persistence of these is of short duration, two separate aggregations of four each resulting, this being the largest number capable of cohering perfectly. A group of four individuals undergoing subdivision is shown in Pl. II. f. 9, from rice field mud. It may here be mentioned that *Asterionella formosa* and *A. Ralfsii*? are occasionally met with in fresh water localities in this country. At a pond on Longacoming, N. J., Mr. Powel made a gathering, containing both these forms, along with a third, which differs so entirely from the described species, as to entitle it to rank as a distinct one. The valves are only about three times as long as broad, somewhat contracted in the centre. The striae are indeterminate. *Asterionella formosa* occurs in the Delaware river, blue clay; also in mud from Cooper's creek. *Diatoma stellaris* of Bailey, is no doubt referable to this genus.

52. *Plagiogramma Gregorianum* Greville.—*Hab.* Entire Atlantic coast, L. I. Sound. At Black Rock Harbor, in mud and on algæ. New London mud. New Haven, Conn. Chesapeake Bay oysters. Rice field mud, Savannah. Never in great quantity.

The frustules of this somewhat doubtful genus vary very much in outline and the vittæ are often absent.

53. *Plagiogramma tessellatum* Greville.—*Hab.* Black Rock Harbor, in mud. Very rare. Only a single perfect frustule has been found by me.

54. *Podosira Montagnei* Kützing.—*Hab.* Newport rocks, dredged by Mr. Powel.

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55. *Podosira maculata* *W. Smith.*—*Hab.* Coast of Florida, on algæ. Rare. Delaware river mud, also rare. Bush river, Del., Mr. Febiger.

56. *Creswellia ferox.*—*Hab.* Black Rock Harbor mud. Bannister's creek, Rockaway mud. Wilmington marshes, Mr. Febiger.

Only detached frustules have heretofore been found, but these were sufficiently characteristic to determine the species.

57. *Mastogloia piculata* *W. Smith.*—*Hab.* Mud from Bannister's creek, Rockaway. Stonington Inlet, on algæ, along with *M. angulata* and *M. lanceolata*. New Rochelle rocks.

58. *Mastogloia lanceolata* *W. Smith.*—*Hab.* Stonington Inlet, with above.

### III. *Species characteristic of the American coast.*

1. *Eupodiscus radiatus* *Bailey.*—*Hab.* Rivers and æstuaries from Charleston to Key West. Savannah rice field mud. Common. St. Mary's river mud, and at Fernandina, Florida. Common in tidal mud; also in algæ from pier at St. Augustine's.

2. *Auliscus pruinosis* *Bailey.*—*Hab.* Long Island, at Black Rock.

3. *Auliscus punctatus* *Bailey.*—*Hab.* Rice field mud, Savannah river. Rare.

4. *Auliscus radiatus* *Bailey.*—*Hab.* Fossil at Kaighn's Point, N. J., on blue clay. Rare. Bannister's creek, Rockaway, L. I. New London harbor, dredged.

5. *Auliscus cœlatus* *Bailey.*—*Hab.* Mud from New London harbor. Delaware river mud. Rare.

A variety of *A. pruinosis*, having three processes, occurs in Savannah river mud. All these species vary much in their markings, and occasionally so nearly approach each other in general character, as to make it very doubtful whether they ought to be kept apart.

6. *Stephanodiscus Niagaræ* *Ehr.*—*Hab.* Riviere du Loup, St. Lawrence river, on algæ. New Rochelle rocks, on algæ.

This fresh water species is quite common in our northern lakes and rivers, but as a marine form is rarely met with. It attains a large size in Lake Memphremagog, Canada, and in one locality, Skinner's Island, a remarkably fine variety occurs. When marine or brackish in its habitat it undergoes a marked diminution in size, preserving, however, the characteristic spines and other specific distinctions. In Kützing's description, (*Species algarum*,) it is spoken of as having a *non-radiate* granular centre, but in all the specimens which have fallen under my notice, this character has been wanting, and the centre both radiate and granular. It is difficult to understand how this very well marked species could ever have been referred to any of the known species of *Cyclotella*.

7. *Hyalodiscus subtilis* *Bailey.*—*Hab.* Atlantic coast. Very rare. San Francisco. On algæ from Long Beach. Abundant, and of large size.

In this latter gathering some of the frustules attained the large size of .009 in diameter. The *F. V.* is very narrow and linear, and the endochrome of a deep grass green color, dries in bands usually affecting the curvilinear course of the striæ. In the recent and unboiled frustules the central granular disc is not perceptible. *H. subtilis* is usually found on the axils of branching algæ, or adherent by a portion of its circumference to their stems.

8. *Surirella limosa* *Bailey.*—*Hab.* Northern Atlantic coast and rivers. Common. L. I. Sound, at Rockaway, mud from creek. Delaware river. Bush 1861.]

river, in mud. Duck creek, Del., mud. Rice field mud, Savannah river. The variety most commonly met with is more broadly ovate than that figured in Mic. Journ., vol. viii., and has a wide, smooth intercostal or more properly acostal space at the larger end of the valve.

9. *Amphiprora pulchra* Bailey. Sporangial of *A. alata*?—*Hab.* Entire Atlantic coast, mostly in still or stagnant salt ditches or streams. It may be observed of this species or variety, that in American localities it outnumbered the supposed typical form, *A. alata*, and more than once I have found it in marshes where not a single frustule of *A. alata* has ever been seen by me. In the salt ditches along the Atlantic, N. J., railroad, *A. pulchra* is a very common form, the frustules ranging in size from that of *A. alata* to the largest dimensions heretofore seen in the former variety, and yet these smaller frustules have all the coarseness of striation and distinctive peculiarities of the largest. The same holds good at another locality, Bannister's creek, Rockaway, where, as well as at Absecom, *A. alata* is very seldom met with. While, therefore, it must be acknowledged that a certain general resemblance, amounting almost to identity of species, exists between the two, it might be well, in view of the above facts, to regard *A. pulchra* as a fixed variety of *A. alata*, and not its sporangium.

10. *Navicula permagna* Bailey. *Pinnularia permagna* Bailey.—*Hab.* In most of our large Atlantic rivers and brackish marshes. At Cape May, salt marsh near Cold Spring, abundant. A variety, illustrating the great range of outline in this species, is seen in Pl. II. f. 11. This is probably the *Navicula esox* of Kützing. It is more common on the Delaware river and its tributaries than that figured by Bailey. This form may be found exhibiting every range of outline between the two extremes. The striation and length of the frustule remains unaltered, however.

11. *Synedra undulata* Bailey.—*Hab.* Long Island Sound. On algae from Newport harbor, Mr. Powel, very fine and large. Occurs in rice field earth, Savannah river.

12. *Tetragramma americana* Bailey = (*Terpsinöe americana*)—*Hab.* Atlantic coast of U. S. L. I. Sound, at New Haven. Black rock and Stonington, in mud. St. Mary's river, Ga., marsh. Delaware river, and at Bailey's locality, St. Sebastian's river, Florida. Although a widely distributed species, I have not found it in any abundance, except at the last named locality. Like *Terpsinöe musica* it is a brackish form, although often found in fresh water streams.

13. *Terpsinöe musica* Ehr.—*Hab.* Southern coast, most some distance up tidal rivers. Rice field mud, Savannah. St. Mary's river, Ga. Blue clay of Delaware river. Very rare.

14. *Podocystis americana* Bailey = (*P. adriatica*?)—*Hab.* L. I. Sound. Light House Point, Black Rock harbor, on algae.

#### IV. *Species of universal distribution along the coast.*

<i>Epithemia musculus.</i>	<i>Triceratium punctatum.</i>
<i>Cocconeis scutellum.</i>	<i>Cyclotella Kützingiana.</i>
<i>Coccinodiscus subtilis.</i>	<i>rotula.</i>
<i>radiatus.</i>	<i>operculata.</i>
<i>eccentricus.</i>	<i>Surirella fastuosa.</i>
<i>oculus-iridis.</i>	<i>gemma.</i>
<i>Eupodiscus argus.</i>	<i>striatula.</i>
<i>sculptus.</i>	<i>ovata.</i>
<i>Triceratium favus.</i>	<i>salina.</i>
<i>alternans.</i>	<i>angusta.</i>

[March,

Tryblionella acuminata.	Pleurosigma fasciola.
punctata.	hippocampus.
scutellum.	Doryphora amphicerus.
Synedra fulgens.	Bœckii.
tabulata.	Podosphenia Ehrenbergii.
gracilis.	Lyngbyi.
affinis.	Rhipidophora paradoxa.
Nitzschia sigma.	elongata?
birostrata.	Achnanthes longipes.
dubia.	brevipes.
plana.	subsessilis.
scalaris.	Rhabdonema adriaticum.
obtusa.	arcuatum.
Amphiprora alata.	Striatella unipunctata.
lepidoptera.	Grammatophora marina.
Navicula firma.	serpentina.
liber.	subtilis.
tumens.	Biddulphia pulchella.
didyma.	rhombus.
lyra.	aurita.
punctulata.	Baileyi.
Smithii.	Podosira hormoides.
cuspidata.	Melosira nummuloides.
amphisbœna.	Borreri.
Pinnularia peregrina.	Orthosira marina.
cyprinus.	Mastogloia Smithii.
Stauroneis pulchella.	Berkleya fragilis.
salina.	Colletonema eximium.
Pleurosigma formosum.	Schizonema cruciger.
elongatum.	Smithii.
angulatum.	Homeocladia filiformis.
Balticum.	

## REFERENCES TO PLATES.

## Plate I.

1. *Surirella pulchra*, n. sp.
2.     *Febigerii*, n. sp.
3.     *ovata* (sporangial).
4. *Cymatopleura marina*, n. sp. a, V. b, F. V.
5. *Amphiprora conserta*, n. sp. a, F. V. b. F. V., seen obliquely to shew the plates. c, V. d, end view of several frustules in union.
6. *Amphiprora Nereis*, n. sp. a, F. V. b, V.  $\times 800$ .

## Plate II.

1. *Navicula marginata*, n. sp. a, F. V. b, V.
2.     *Poweli*, n. sp.
3.     ——— ? n. sp.
4. *Mastogloia angulata*, n. sp.
5.     *exigua*, n. sp. a, V. b, F. V.  $\times 800$ .
6. *Navicula trinodis*. a, V. b, variety from St. Mary's River. c, F. V.
7. *Pinnularia* (*Navicula*) *polyonca*.
8. *Podosphenia Baileyi*. a, F. V. b, V.
9. *Asterionella Bleakleyi*.
10. *Asterionella*? ———. From same locality as *A. formosa*—Long-coming, N. J.
11. *Navicula permagna*. Var.

[Where not otherwise specified, the magnifying power used has been 500 diameters.]

1861.]

Permission being given, Mr. Cassin made the following communication in reference to a new species of Goose from Arctic America.

Mr. Cassin called attention to a series of specimens of Geese from Arctic America, and especially to fragments of a specimen from Great Slave Lake, recently received at the Smithsonian Institution, and by the officers of that Institution kindly sent to him for examination. These fragments include head, wings, tail and legs, and were accompanied by one nearly complete skin, which is now exhibited in the Smithsonian Museum, and clearly represent a species not before known to naturalists, but are undoubtedly the "Horned Wavy" described by Hearne in *Journey to the Northern Ocean*, p. 442, (Quarto ed. London, 1795; Octavo ed., p. 444, Dublin, 1796.) This species has never again been noticed from the time of Hearne until the receipt of the present specimens from Mr. Robert Kennicott, an enterprising young naturalist, now in the northern regions of British America, but has been constantly insisted on as a valid species in his letters to the Smithsonian Institution by Mr. Bernard R. Ross, an enthusiastic naturalist and careful observer in the service of the Hudson Bay Company.

The "Horned Wavy" is nearly allied to and of the same colors as the two other species of northern Geese now before the Academy, which are *Anser hyperboreus* and *albatus*, but is readily to be distinguished from either by its much smaller size and the numerous caruncles on the bill near its base. These characters are very nearly as given by Hearne, and in all respects his description is accurate and sufficient to determine the identity of the species, and that it is different from any other.

Mr. C. here read Hearne's description :

"Horned Wavy. This delicate and diminutive species of the Goose is not much larger than the Mallard Duck. Its plumage is delicately white, except the quill feathers, which are black. The bill is not more than an inch long, and at the base is studded around with little knobs about the size of peas, but more remarkably so in the males. Both the bill and feet are of the same color with those of the Snow Goose.

"This species is very scarce at Churchill river, and I believe are never found at any of the Southern settlements; but about two or three hundred miles to the northwest of Churchill I have seen them in as large flocks as the common Wavy or Snow Goose. The flesh of this bird is exceedingly delicate; but they are so small, that when I was on my journey to the North, I eat two of them one night for supper. I do not find this bird described by my worthy friend, Mr. Pennant, in his *Arctic Zoology*. Probably a specimen of it was not sent home, for the person that commanded at Prince of Wales' Fort, at the time the collection was making, did not pay any attention to it." (Hearne's *Journey to the Northern Ocean*, quarto, p. 442; octavo, p. 444, 5.)

In the Proceedings of this Academy for February, 1856, (vol. viii. p. 41,) is a notice of three species of North American Goose which had previously been confounded under the name of *Anser hyperboreus*, and further observations have tended more fully to confirm my opinion there expressed. The present is a third species of the white geese inhabiting the hyperborean regions of America, for which I propose the name of *Anser Rossii* at the suggestion of Prof. Baird of the Smithsonian Institution.

In addition to the three species which are white, a fourth I have only seen with the head white. The last is the *Anser carulescens*, (Linnæus.) The four species may be characterized as follows :

1. ANSER HYPERBOREUS, Pallas.

*Anser hyperboreus*, Pall. *Spic. Zool.* i. p. 25 (1769.)

Large, about the size of *Bernicla canadensis*, total length about 31 inches, wing  $18\frac{1}{2}$ , tail  $6\frac{1}{2}$ , bill along the culmen from tip to frontal feathers  $2\frac{1}{2}$ , tarsus  $3\frac{1}{4}$  inches. Entire plumage in adult, white, except ends of primary quills which

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are black; bill and feet red. Front and sides of head frequently spotted with dull rusty reddish. Young, dull bluish or pale lead colored on the head and upper parts of body.

2. *ANSER ALBATUS*, Cassin.

*Anser albatu*s, Cass. Proc. Acad. Philada., 1856, p. 41.

Smaller than the preceding, about the size of *Bernicla Hutchinsii* or *B. albifrons*. Total length about 25 inches, wing  $15\frac{1}{2}$ , tail  $5\frac{3}{4}$ , bill along the culmen 2, tarsus 3 inches. White, ends of primaries black; bill and feet red. Young, dull bluish cinereous.

3. *ANSER ROSSII*, Baird.

Smaller than either of the preceding, and the smallest goose known to inhabit North America. About the size of the Mallard Duck, (*Anas Boschas*.) Total length about 21 inches; wing  $14\frac{1}{2}$ ; tail 5; bill along the culmen  $1\frac{1}{2}$ ; tarsus  $2\frac{1}{2}$  inches. Bill strongly warded or carunculated in front and on its sides near and at its base. Entire plumage white; ends of primaries black; bill and feet red, both probably darker than in either of the preceding.

4. *ANSER CÆRULESCENS*, (Linnæus.)

*Anas cœrulescens*, Linn. Syst. Nat. i. p. 198 (1766.)

About the size of *A. albatu*s, or of *Bernicla Hutchinsii*. Total length about 24 inches; wing 16; tail  $5\frac{1}{2}$ ; bill along the culmen  $2\frac{1}{4}$ ; tarsus 3 inches. Tertiary quills rather long and inclined to curve downwards. Head and neck white; body above and below dark ashy brown, nearly black on the back; rump and upper tail coverts ashy white; abdomen and under tail coverts white; wing coverts light cinereous; primary quills black; tertiaries dark brown, widely edged with pale ashy. Bill and feet red.

The last species has been regarded by American naturalists as the young of *Anser hyperboreus*, and is figured as such by both Wilson and Audubon, but, I am confident, without sufficient evidence that such is the fact. The young of both *A. hyperboreus* and *A. albatu*s are in the collection of this Academy, and are quite different from this species.

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April 2d.

MR. LEA, President, in the Chair.

Forty-four members present.

Mr. Lea exhibited a specimen of slag from the iron furnace of McKelney, Neal & Co, Bloomsburg, Pa. It was in the form of a cotton-like mass of spun glass, and about two tons of the material were blown out in one hour.

Papers were presented for publication, entitled

“On the identity of the genera *Neomaenis* of Girard, and *Lutjanus* of Bloch, by Theo. Gill.”

“Revision of the genera of *Sciæninæ* of North America, by Theo. Gill.”

And were referred to Committees.

The number of the Proceedings for March was laid upon the table.

Mr. Cope stated, that he had an opportunity, during a recent visit to the Smithsonian Institution, Washington, of instituting comparisons between certain genera and species of reptiles. These resulted in his conviction of the necessity 1861.]

of certain changes of nomenclature, some of which he briefly noticed. He would now place as synonyms of *Tantilla Baird* and *Girard, Homalocranium Dum.*, and *Lioninia*\* Hallow., excluding the species of Duméril which possess a loreal shield, under the name *Scolecophis Fitz.*, *Scolecophis fumiceps*† Cope, was *Tantilla nigriceps Kenn.* The appended synopsis was offered, for the purpose of facilitating the recognition of the species.‡

*Tæniophis imperialis*|| he found to be a fourth species of *Coniophanes*. He agreed with Dr. Girard§ that *Tæniophis* was a synonym of *Dromicus*; the *T. vermiculaticeps*¶ belongs to a distinct genus—but he was not prepared to name it. *Tropidonotus compsolanus*\*\* Cope, he now believed to be a *T. compressicaudus Cope*,†† with a very slight compression of the tail, and the markings above and below obsolete. The probable identity of *Trop. medusa*‡‡ Gthr. with *T. Clarkii*,||| suggested by Prof. Baird, he had since been able to verify; a comparison, also, of *Ablabes purpureocauda*§§ Gthr. with *Contia mitis*¶¶ *Bd.* and *Grd.*, likewise suggested by Prof. Baird, had resulted in their identification.

In the course of an examination of the specimens collected by the North Pacific Exploring Expedition, he had observed, that *Lepidocephalus fuscatus*\*\*

\* Proc. Acad. Nat. Sci., Phil., 1860, p. 484.

† Op. cit. 1860, p. 371. Locality "Cuba," probably erroneous.

‡ *Tantilla Bd. and Grd.* Catal. Serp. Smiths. Inst. 1853, p. 131.

I. One postocular plate.

Superior labials seven, - - - - - planiceps.

Superior labials six; postnasal in contact with preocular; symphyseal and genaeal separated by labials, - - - - - gracilis.

Superior labials six; postfrontals in contact with labials; genaeals in contact with symphyseal, - - - - - Hallowellii.

II. Two postoculars, (superior labials seven.)

α. Body unicolor, or longitudinally banded.

\* Postfrontals widely separated from super-labials.

Tail between one third and one-fourth the total length, - - - - - reticulata.

Tail one-fifth the total length; postnasal equal second superior labial, - - - - - coronata.

\*\* Postfrontals in contact with, or scarcely separated from superior labials.

A dark half-collar; postnasal much smaller than second superior labial, - - - - - melanocephala.

No dark half-collar; rostral plate prominent, acute; symphyseal plate in contact with genaeals, - - - - - vermiformis.

No dark half-collar; rostral plate obtuse; symphyseal and genaeal plates separated by anterior inferior labials, - - - - - nigriceps. (a)

β. Body semiannulate.

With narrow yellow bands upon black ground, - - - - - laticeps. (b)

With black of equal breadth with the intervals of white ground, - - - - - semicineta.

|| U. S. and Mex. Bound. Surv. Zoology, Reptiles, p. 23, pl. 19, f. 1.

§ Herpetology of U. S. Exploring Exp. p. 161.

¶ Proc. Acad. Nat. Sci. 1860, p. 249.

\*\* Proc. Acad. Nat. Sci. 1860, p. 368.

†† *Nerodia compressicauda* Kenn. Op. cit. 1860, p. 335.

‡‡ Catal. Brit. Mus. p. 78.

||| *Regina Clarkii*, *Bd.* and *Grd.* Catal. p. 48. Mex. Bound. Surv. Reptiles, p. 17.

§§ Catal. Brit. Mus. p. 245.

¶¶ Catal. Serp. Smiths. Inst. p. 110.

\*\*\* Proceed. Acad. Nat. Sci. Phila. 1860, p. 498.

(a) Kennicott, Proc. A. N. S. 1860, p. 328.

(b) Gunther, P. Z. S. 1860, p. 240.

Hallow. was identical with *Eumesodon semicarinatus*<sup>a</sup> Cope; also that *Aepidea*<sup>b</sup> Hallow. could not be distinguished from *Gonyosoma Wagl.*

He stated that he had also noted that Dr. Girard's *Rhabdion occipitale* from Australia, was a Najid of the genus *Glyphodon*<sup>d</sup> *Gthr.*; perhaps distinct from the species described by the latter author. *Callirhinus*<sup>e</sup> of the same author was not isodont, as stated by him, but glyphodont, and bearing some resemblance to *Malpolon Fitz.* *Simotes ancorus* expressed the true generic association of his *Xenodon ancorus*<sup>f</sup>; it is from Luzon, and identical with *Simotes phanochalinus* Cope. The *Erythrolamprus venustissimus* of the same author,<sup>h</sup> is properly *E. albostolatus*<sup>i</sup> Cope.

Specimens of *Lepidosternum Florida* Baird<sup>k</sup> were exhibited. Mr. Cope stated that this Amphibœnian reptile was evidently typical of a form generically distinct from *Lepidosternum*, which he would name *Rhineura*. In the form of the head, and presence of nasal shields it resembled *Phractogonus Hallow.* from Africa; in the shielding of the crown and absence of preanal pores it was similar to *Lepidosternum*. It differed from both in the depressed, superiorly tuberculous tail. This structure was appropriate to its burrowing habits. The eyes, if existing, were entirely invisible. According to Prof. Baird, the *R. Florida* was common in the country from which it takes its name. It emerges from its subterranean retreats after thunder showers; hence its vernacular name of "Thunder Worm."

The specific characters were as follows: A broad crescentic rostral plate: immediately posterior to this on the median line are an oblong frontal, broader than long, and a large irregularly pentagonal vertical, with its posterior angle prolonged between two small occipitals; three small plates on each side of the vertical. Four superior labials on each side—the last three times the size of the third. The first separated from that of the other side by a trapezoid inferior rostral, and bounded above by a transversely elliptical nasal, which is pierced by the nostral above its centre. Three loreal plates in a series behind the nasal and above the labials—the first much the longest. Superior maxillary teeth five on each side; the anterior pair longest; inter-maxillary one; mandibular, each ramus, six. Inferior labials three or four; one symphyseal, one pair genials, one mento-labial on each side. Sternal plates small, irregular, about twelve in number. Vent very crescentic; three pairs of preanal plates in a longitudinal series. Fourteen rings upon the tail, all more or less tuberculous superiorly except the two basal ones. Color dirty white; upper surface of the head yellowish.

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April 9th.

MR. LEA, President, in the Chair.

Forty-nine members present.

A paper was presented for publication, entitled

"On the marine shells brought by Mr. Drexler from Hudson's Bay, and on the occurrence of a Pleistocene deposit on the Southern shore of James' Bay, by W. Stimpson," and was referred to a Committee.

Mr. Cope made some remarks defining the following species of Reptilia Squamata: two of them he regarded as representing genera not previously known. He said: The generic form which I propose calling *Diphalus*, belongs

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<sup>a</sup> Op. cit. 1860, p. 263. <sup>b</sup> Op. cit. 1860, p. 488. <sup>c</sup> Herpetology U. S. Expl. Exped. p. 120. <sup>d</sup> Catal. Colubr. Brit. Mus. p. 210. <sup>e</sup> Herpetology U. S. Expl. Exped. p. 139. <sup>f</sup> Op. cit. p. 167. <sup>g</sup> Proc. Acad. Nat. Sci. Phila. 1860, p. 244. <sup>h</sup> Herpetology U. S. Expl. Exped. p. 169. <sup>i</sup> Proc. Acad. Nat. Sci. Phila. 1860, p. 250. <sup>k</sup> Op. cit. 1858, p. 253.

to the Amphibænidæ, and may be diagnosed as follows: Dentition pleurodont; muzzle conic, acute; nostrils lateral, each in a single plate, which is separated from that of the opposite side by a backward prolongation of the rostral. Two elongate rostro-frontals, in contact with the rostral anteriorly. Eye visible beneath the ocular shield. Preanal pores present.

*D. fenestratus* Cope had been discovered in the West Indian Islands of St. Thomas and Santa Cruz, by Mr. A. H. Rüse, of the former. The largest specimen obtained measured nine inches and six lines in length. The species is of cylindrical form. The dermal rings are uninterrupted, divided into squares above, more broadly segmented on the abdomen; caudal whorls twelve. Three upper labial plates, second much the longest, and in contact with fronto-rostral. Ocular trapezoid, anteriorly acute. Two or three temporals, two cuneiform frontals. One small symphyseal, and one large genæal, both of them but little longer than broad. Three inferior labials, third twice the size of the first, one-fourth the size of the second. Color pale brownish white, each dermal segment marked with a small rectangular brown spot. The animal differs from *Typhloblanus caecus* Fitz., in the separation of the nasal plates, from *Cadea punctata* Gray, in the double rostro-frontal, and from both in the distinctness of the eyes.

*Amphibæna angustifrons* is allied to *A. Pretrei* and *A. vermicularis*, but has a much shorter tail than either, beside other characteristic peculiarities. The form of the muzzle is quite similar to that of the species above described, being compressed conic. Rostral plate triangular, its apex only visible from above, separated from the rostro-frontals by the united nasals, as in the other species of the restricted genus. Rostro-frontals rather broad, the anterior outline curved, the posterior more curved. Thus the frontal pair, whose posterior border is also curved, exhibit an almost circular outline. A trapezoid ocular, bordered above by the rostro-frontal, posteriorly by a large temporal. Three upper labials, commissural border of the first longer than that of the others. Its supero-anterior border continuous with that of the second, its posterior with that of the nasal. One subtriangular symphyseal; one large gemmiform, genæal; its anterior angle truncate; three inferior labials, second much the largest, bounded beneath by a subtriangular mento-labial; third labial small, elongate. Five superior maxillary teeth on each side, seven intermaxillaries (medial longest,) sixteen mandibulars. Four preanal pores; vent curved, bordered by ten narrow preanal plates. Caudal rings fifteen or sixteen. A specimen in the Academy Museum was brought from Buenos Ayres, by Dr. Kennedy.

*Loxocemus* Cope is a very remarkable genus of peropodous Ophidians, exhibiting several points of resemblance to the Calamarians, such as its cylindrical body, short tail, small eye, and narrow, conic head. The rostral plate finds a parallel in that of *Rhinocheilus* Bd. and Grd. and *Arizona Kenn.* also less closely in *Stenorhina Dum.* There is also a striking resemblance in the form of the head and pupil of the eye to *Olisthenes Cope*, (*Scytale* Boie, nec Merr., *Pseudoboa* Cope, nec Schneid.) *O. Neuwiedii* is quite similar in its style of coloration to *L. bicolor*. Without acquaintance with other allied genera, it is difficult to decide as to whether *Loxocemus* should enter the Boinæ, or be regarded as the type of a new subfamily of aglyphodont eurystomatous serpents. Its diagnosis will be as follows: Body stout, cylindrical; tail short, urosteges two-rowed. Anal spurs small; metatarsal and tarsal bones large, tibia elongate curved, compressed and expanded at the distal extremity. Preanal plate bifid; gastrosteges narrow; scales smooth. Head small, indistinct, superiorly plane. Muzzle prominent, obliquely truncate. Rostral plate large, transverse, slightly elevated, encroaching on the prefrontals. Two pairs of frontals, the anterior very transverse, the posterior not completely separated from the large loreal. An elongate polygonal vertical. One small superciliary on each side, a narrow lateral occipital, and a

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small medial interoccipital. Eye small, resting on the labials, which are not pitted; pre- and postoculars present; pupil elliptic, erect. Teeth slightly longer on the anterior parts of the dentigerous bones than on the posterior. Intermaxillary bone toothless; supraorbital bone none.

*L. bicolor* possesses three postocular plates; one large preocular is extensively in contact with the vertical; the latter plate presents an obtuse angle anteriorly, and is nine-sided. Superior labials ten, fourth and fifth entering the orbit. Twelve inferior labials. One pair of very narrow genials, with a sulcus between them, and separated from the labials laterally by a single narrow plate on each side. Scales in thirty-four longitudinal rows; those of the inferior, half as wide as the gastrosteges. The tail and upper surface of the body, between the fourth rows of scales on each side, are of a rich purplish brown. Belly, chin, and upper labials yellow. One specimen brought by Capt. J. M. Dow, from La Union, San Salvador, and presented to the Smithsonian Institution. No. 4948.

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April 16th.

MR. LEA, President, in the Chair.

Thirty-nine members present.

A paper was presented for publication, entitled

“Description of a new genus (*Strepobasis*) of the family Melaniadæ, and three new species, by Isaac Lea,” and was referred to a Committee.

Dr. Leidy mentioned that lignite had been discovered at the border of the new red sandstone on Plymouth Creek, near Norristown, Pa.

The death of Dr. John E. Evans, a correspondent of the Academy, was announced; he died at Washington, D. C., on the 13th inst.

A communication was made by Mr. Theo. Gill on several new generic types of fishes contained in the museum of the Smithsonian Institution.

The first was referred provisionally to the Agonoids, as an Agonoid under the guise of a *Peristedion*. It presented a very strong resemblance to the representatives of the latter genus, and would doubtless, at the first glance, be conceived to be very nearly allied to them. But with the same form as *Peristedion*, it has the head constructed on essentially the same plan as that of a true *Agonus*. The first suborbital bone expands inferiorly; the second covers the cheek, and both are armed with an inferior submarginal crest: the crest of the second has a median curved spine, from which radiating grooves and ridges advance on the surface. The snout, like that of *Agonus*, has on each side two spines, one horizontal and the other curved backwards. The dorsal fin is separated by several plates from the head. The thoracic region is covered with about three rows of more or less hexagonal plates, except in front, where there are only two plates. The ventral fins are approximated, and received in an elongated triangular groove or furrow. In allusion to the last named peculiarity, the genus was named *Podothecus*.

The family of Agonoids is now increased by this addition so as to include at least five described genera; they are the following:

*Podothecus Gill.*

*Agonus Bloch* = *Aspidophorus Swainson.*

*Brachyopsis Gill* = *Agonus Swainson.*

*Hippocephalus Swainson.*

*Aspidophoroides Lac.* = *Canthirhynchus Swainson.*

The new Agonoid was obtained by Dr. Kennerly, the zoologist of the North-  
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western boundary Survey, at Washington Territory, and will be fully described and figured in the report on the fishes collected by the naturalists of that expedition.

The next form noticed was also claimed to be most worthy of attention on account of the singular combination of characters which it presented, and which might render even the family to which it belongs a question of doubt. Yet the resemblance to the genus *Genyoroge* of Cantor or *Diacope* of Cuvier was so very great, that the speaker affirmed there was positively no external character to distinguish them as genera except the position of the anterior nostrils. Those nostrils, in the fish under consideration, were short tubes present at the margin of the snout; that character was very characteristic, and by it the genus was easily distinguished from all other allied forms.

On examining the dentition and the branchiostegal membrane, remarkable differences are also found between it and the Lutjaninæ. The former have a dentition much like that of *Serranus*, but the new fish was said to have more or less blunt conical teeth, like the Pagrine Sparoids, both on the jaws and the vomer. There were no palatine teeth. In each jaw there are four large and robust teeth in front; behind, there is a row of smaller ones: behind the row of the upper jaw, is at least one row of smaller molar or pisiform ones, and behind the corresponding row of the lower, there is, on each side, one molar. There are also three short and very obtuse conical molars on the front of the vomer. Only five branchiostegal rays could be detected on each side.

The speaker alluded to this form, as affording additional evidence of the intimate connection that exists between the Percoids and the Sparoids, and added, that if the armature of the preoperculum and the dentition of the vomer were not taken into account, it might with almost equal propriety be referred to the Sparoids or the Percoids. Dr. Günther, by admitting the *Pimeleptera* in the family of Sparoids, has refused to acknowledge the presence or absence of teeth on the palatine arch as a character of family value in those fishes, and with his limitation the present genus would belong to that family. But the speaker preferred to regard it as the type of a distinct sub-family, intermediate between the Lutjaninæ and the Pagrinæ, and named it Hoplopagrinæ. The genus was called *Hoplopagrus*. The speaker promised to describe the species hereafter, and in testimony of his appreciation of the advances rendered by Dr. Günther towards a more natural classification of the Sparoids, Pristipomatoids and allied groups, would dedicate it to that gentleman.

In connection with the subject, the cases of the genera *Haploidinotus*, *Corvina*, and *Rhinoscion* were alluded to. The resemblance between the first and last two genera was very strong. That between *Haploidinotus* and *Corvina* was indeed so great, that there were no external characters which alone would be sufficient to justify their separation as even genera; but an examination of the pharyngeal bones demonstrates that they are not even members of the same natural sub-family. *Rhinoscion*, established for the *Ambodon saturnus* of Girard, affords a less close analogical resemblance to *Haploidinotus*.

Mr. Gill also corrected an erroneous reference to a genus made in the catalogue of the fishes of the eastern coast of North America. He had there referred the three American species of the *Monacanthi* of Cuvier to the genus *Cantherines* or *Canthorhinus* of Swainson, not daring without further evidence to propose for them a distinct one. Having since been able to examine the description of the species given in the zoology of Freycinet's voyage in the library of the Academy, he found that our species were generically different, and proposed to confer on them the name of *Stephanolepis*, in allusion to the crown-like crest with which the central part of each scale is adorned. The *Monacanthus setifer* of Bennett may be considered as the type. The speaker had never seen specimens of the *Monacanthus broccus* of Dekay, and could not say whether it was congeneric with the other two species or not.

*April 23d.*

Vice-President, BRIDGES, in the Chair.

Thirty-one members present.

A paper was presented for publication, entitled

“Notes on the habits of *Aphredoderus Sayanus*, by Charles C. Abbott,” and was referred to a Committee.

*April 30th.*

MR. LEA, President, in the Chair.

Twenty-three members present.

On report of the respective Committees, the following papers were ordered to be published :

**Revision of the Genera of North American SCIÆNINÆ.**

BY THEODORE GILL.

The present memoir has resulted from our studies of the characters of the *Liostomi* and other American Sciænoids, and was intended only to embrace the diagnoses of our genera, but in order to appreciate more fully the relations of those forms, we were induced to study the foreign ones, and have believed that the results are of sufficient interest and importance to submit to ichthyologists. There is a number of other genera confounded under those of Cuvier, but as a gentleman of the Museum of Comparative Anatomy of Cambridge is understood to be engaged in the profound study of the whole family, we refrain from naming and characterizing them. The diagnoses of the exotic genera here described will be sufficient to enable the reader to appreciate the distinctions which exist between our own species and those of the genera with which most of them have been hitherto considered congeneric.

Subfamily SCIÆNINÆ Gill.

The body varies in shape, ranging from an oblong rhomboideo-ovate form to an elongated fusiform one. When the inferior outline of the head ascends to the snout, it is with a very gradual and slight curve. Both jaws are formed with teeth, which are of a more or less acutely conical form.

The dorsal fins are united by a slightly elevated membrane; the first is of moderate height, being longer than high; the second is oblong or elongated. The anal fin is of a trapezoidal form, and as high or higher than long. The ventral fins are generally inserted under or behind the bases of the pectorals, rarely a very short distance in front.

The scales are ctenoid and generally arranged in very oblique rows.

The inferior pharyngeal bones when in place form a triangular U or V-shaped body with a broad triangular excavation, whose sides are slightly emarginated, and whose anterior apex is suddenly continued to an oblong triangular fissure between the opposite bones. Each bone is itself semi-claviform and more or less curved upwards behind; its external vertical margin is straight or nearly so; its internal margin, for the first half of its length, is also straight, but thence, with a slight sigmoid curve, converges to the end of the posterior prolongation of the bone. Beneath the bone, there is an external ridge which is marginal before but slightly recedes behind.

The upper pharyngeal bones are six, or three on each side; the median is subtriangular or triangularly-ovate; the external, or anterior and posterior elongated in the direction of the sides of the median; the posterior is broadest, and has a more or less subovate form.

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The teeth of the pharyngeal bones are well developed and card-like, more or less conic, and largest on the median upper pharyngeal, and nearest the internal borders of the lower.

The setæ or setose laminae of the anterior ceratobranchials are short or moderate, compressed, and more or less armed with slender acute teeth on their inner margins.

The subfamily of Sciæninæ as thus restricted will include the *Otolithi*, whose lower jaw projects beyond the upper, as well as the *Sciænæ*, *Corvinæ* and allied fishes, whose lower jaw is shorter and more or less embraced within the upper. The groups thus differing might possibly be considered as distinct families and characterized as follows:

#### OTOLITHINÆ.

\* This group is distinguished by its more or less equally subelliptical sub-oval or fusiform body, covered by very oblique rows of moderate or rather small scales. The mouth is terminal, the lower jaw being produced or considerably longer than the upper. Both jaws are armed with teeth. The margin of the snout is entire. The limbs of the lower jaw have very minute and scarcely visible pores. The dorsal fins are more or less united at their base; the second is long. The ventral fins are situated near the vertical of the bases of the pectorals, rarely before.

#### CORVININÆ.

The body is covered with generally very oblique rows of moderate or large scales. The mouth is more or less inferior, the lower jaw being received within the upper. Both jaws are armed with teeth. The margin of the snout is generally more or less quadrilobate between the suborbital bones; the incisions oblique, and those next the bones always deepest. The limbs of the lower jaw have usually each two pores, and there is almost always one near the symphysis. The dorsal fins are more or less united at their base; the second long. The ventral fins are inserted more or less behind the pectorals.

But as the greater length of the lower jaw is the only constant character, the propriety of doing so with our present knowledge of the subject is very doubtful. We will therefore regard them as simple sections which may not be even natural, the differences existing in the *Cynoscion*s or American *Otolithi*, and the typical *Sciænæ* being perhaps of even less value than those which distinguish the *Sciænæ* from fishes like the *Umbrinæ*, *Micropogons*, and others.

The characters which distinguish the Sciæninæ from the Liostominæ and Haploidinotinæ are trenchant and very distinct, but are almost entirely anatomical, there being positively no external characteristic or features between the first and last which would serve for their restriction. Yet the distinction between all of the Sciæninæ and of the Haploidinotinæ is founded on a character which has been regarded by many of the most profoundly learned ichthyologists as of even ordinal value. The differences which exist between the Sciæninæ and Liostominæ are of almost equal value, and serve well to illustrate the importance of more profound investigations of the characteristics of animals than are usually instituted.

#### § 1.

Lower jaw projecting beyond the upper.

Genus OTOLITHUS Cuvier.

*Otolithus Cuvier*, Regne Animal, ed. i. vol. i.

Type. *Otolithus ruber Cuv.*

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Genus *CYNOSCION*\* Gill.

*Otolithus* sp. *Cuvier*, Regne Animal, ed. i. vol. ii. p. 299.

*Cestreus* *Gronow*, Catalogue of Fish collected and described by L. T. Gronow, now in the British Museum, p. 49. 1854.

Body elongated and nearly fusiform. Caudal peduncle of moderate size.

Head oblong-conical, with a scarcely convex snout. Eyes wholly in the anterior half of the head. Mouth oblique; the supramaxillars cease nearly under or little before the posterior borders of the orbits. Lower jaw protuberant. Preoperculum with its margin membranous and crenulated.

Teeth distant and recurved, nearly biserial in the lower jaw, in front preceded by an additional row; nearly biserial in the upper jaw, and normally with a canine tooth on each side of the symphysis; one is generally deciduous.

Anterior dorsal fin with generally nine or ten spines; posterior of normal size. Anal fin trapezoidal, with only one very slender spine apparent externally. Caudal fin subtruncated. Ventrals in the same relative position as those of *Sciæna*.

Lateral line with a sigmoid flexure, tubular, in scales formed like those of the rest of the body.

The pharyngeal bones are armed with acute teeth; those of the upper are considerably curved. The setæ of the first ceratobranchials are slender; their teeth are rarely in more than one or two irregular rows, and are but slightly curved. The internal sides of the first and both sides of the remaining branchial arches have a row of appressed semioval plates, armed with curved teeth, increasing in size towards the margin; besides the row of marginal plates, the sides have also many smaller ones.

This genus is somewhat allied to *Sciæna*, but differs especially in the protrusion of the lower jaw, the presence of symphyseal canine teeth in the upper, the character of the preoperculum, and the single slender spine of the anal fin.

It is also nearly allied to the typical *Otolithi*, differing from them by the absence of canine teeth on the lower jaw, the condition of the margin of the preoperculum, the presence of only one anal spine, the character of the lateral line, and especially in the position of the ventral fins.

Type. *Cynoscion regalis* *Gill*.

*Syn.* *Otolithus regalis* *Cuv. et Val.*

## § II.

Lower jaw received within the upper.

Genus *SCIÆNA* (Artedi.)

*Sciæna* sp. *Artedi*, Genera Piscium, Gen. xxix.

*Sciæna* *Cuv.*, Regne Animal, ed. ii. vol. ii.

Body elongated, with the dorsal outline slowly descending and slightly arched from the dorsal to the snout, and under the second dorsal nearly straight. Caudal peduncle of moderate size.

Head oblong-conical, the superior surface declining more rapidly than the lower ascends. Snout before convex. Eyes in the anterior half of the head. Mouth oblique; the supramaxillary bones continued nearly to the vertical of the hinder border of the orbit. Lower jaw little shorter than the upper, and received within the external row of teeth of the upper jaw.

Preopercular margin denticulated.

Teeth in each jaw in one row, distant, recurved and rather large; behind the external row in the upper jaw there is a band of smaller teeth; in the

\* Composed of *κύων*, dog and *σκίον*, the modern Greek name of the *Umbrina cirrhosa*, according to Rondelet. The name of *Cynosciæna* would not be euphonious.

lower, there is an external one of smaller teeth, and at the symphysis still smaller ones are mixed between the two rows.

Anterior dorsal fin sustained by nine spines; the posterior of normal size, and generally provided with less than thirty rays. Anal fin of the usual size; its second spine short. Caudal subtruncated. Ventral fins inserted behind the bases of the pectorals.

Lateral line parallel with the back, simply tubular and perforated in scales, similar to those of the rest of the body.

The armature of the pharyngeal bones and arches resembles mostly that of *Cynoscion*, but the plates are not compressed, but rather developed as projecting ridges, and the supernumerary plates are very few or obsolete.

Type. *Sciæna aquila* Cuv.

#### GENUS ANOMIOLEPIS Gill.

Body compressed, scarcely elongated and subclavate, with the caudal peduncle of moderate length.

Head short, with the muzzle short and convex, and with the lower jaw also ascending upwards with a slight curve.

Preoperculum with its margin moderately oblique and apparently dentated.

Eyes mostly anterior. Mouth oblique. Supramaxillary bones well exposed, and extending to or beyond the posterior borders of the pupils. Lower jaw received within the external row of teeth of the upper.

Teeth uniserial; those of the upper jaw distant, and the anterior much larger; those of the lower jaw increasing in size backwards.

Anterior dorsal fin furnished with about ten spines; second elongated. Anal fin with its first spine short and its second moderate. Caudal fin probably rounded or lanceolate.

Lateral line running through a row of subcircular cycloid scales, whose posterior margin have each a subcircular incision.

The pharyngeal bones and arches are furnished nearly in the same manner as in *Sciæna*.

This genus is represented by a new species, of which two specimens were found at Hong Kong, China, by Dr. Stimpson. Only a single specimen is at present accessible, and on it we cannot find a band of villiform teeth behind the external row of large ones, even with the aid of a good lens, and are consequently compelled to believe that there is none. The species appears to be related to the *Corvina tridentifer* of Richardson, which has a band of villiform teeth behind the external ones; but besides this character, which is of generic importance, it differs in others. Like the fish of Richardson, the present species has four large teeth in front in the upper jaw.

The name which has been bestowed on this genus is intended to draw attention to the peculiar structure of the scales of the lateral line, which remind the observer of the perforate valve of a shell of the genus *Anomia*.

#### GENUS PLACIOSCION Gill.

Body elongated, well curved from the dorsal to the snout, and almost straight under the second dorsal; abdominal outline nearly straight. Caudal peduncle short and slender.

Head moderate, compressed and subconical, slightly depressed over the eyes, and with the muzzle rather short, high, subtruncated, and protuberant. The external fissures alone are slightly developed. Mental pores obsolete. Preoperculum with its crest and margin oblique, nearly parallel, and with its margin dentated most at its angle. Eyes anterior. Mouth oblique. Supramaxillary bones mostly concealed, extending below the posterior borders of the orbits. Lower jaw received within the upper. Lips fleshy.

Teeth in the upper jaw in a villiform band surrounded by a row of stronger ones; larger ones nearly uniserial, mixed with smaller in the lower jaw.

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Anterior dorsal fin with ten spines; second long. Anal with its second spine robust. Caudal lanceolated.

Lateral line much curved under anterior third of the second dorsal fin.

The pharyngeal bones and arches present no well marked peculiarities to distinguish them from those of the *Sciæna*.

This genus is proposed for a new species of the Caribbean Sea, which has considerable resemblance and affinity to the so-called *Sciæna lucida* of Richardson and *Sciæna pama* of Cuvier and Valenciennes; but yet, on account of the robust second spine of the anal, if consistency should be observed, would be referred to the genus *Corvina*, by those who adopt the genera of *Sciænoidea* of Cuvier.

#### Genus HOMOPRION Holbrook.

*Homoprion* sp. *Holbrook*, Ichthyology of South Carolina, p. 168.

Body oblong, compressed, and with a form similar to that of *Bairdiella*.

Head also like that of *Bairdiella*. Mouth terminal and oblique. Supramaxillary bones ending under or nearly under the pupil.

Preoperculum with a lobed and distinct crest, and with its posterior-angular margin armed with radiating spines. The pores are probably similar in development to those of *Bairdiella*.

Upper jaw armed "with a row of rather stout, conical, recurved teeth," behind which "are numerous, small, card-like teeth;" lower jaw with "one group of small, card-like teeth."

Anterior dorsal fin provided with about eleven spines. Anal fin with its second spines equalling in length two-thirds of the succeeding articulated ray. Caudal fin cuneate or lanceolate.

No specimens of the *Homoprion lanceolatus*, which is the type of the genus, are at present contained in the museum of the Smithsonian Institution. The preceding diagnosis has therefore been principally compiled from the description and figure given by Dr. Holbrook.

As previously observed, the *Homoprion subtruncatus* of Gill does not appear to be congeneric with the type, but to be more nearly allied to, if not, indeed, a representative of the same genus as the *Bairdiella argyroleuca*.

Type. *Homoprion lanceolatus* *Holbrook*.

#### Genus BAIRDIELLA Gill.

*Perca* sp. *Mitchill*.

*Corvina* sp. *Cuv. et Val.*

*Bairdiella* *Gill*, Catalogue of the Fishes of the Eastern coast of North America, p. 33, February, 1861.

Body oblong, compressed, with the dorsal outline rapidly descending in a nearly straight line from the dorsal fin, and with the abdominal outline nearly straight.

Head compressed, conical, with the muzzle scarcely convex, and with the lower jaw ascending. Mouth terminal and oblique. Supramaxillary bones mostly exposed, and ceasing under or slightly behind the pupil of the eyes.

Preoperculum with no distinct crest; its posterior margin and rounded angle denticulated, the teeth increasing in size towards the angle. Two lateral pores of each ramus of the jaw small; the two symphyseal ones rudimentary.

Anterior row of stout and recurved conical teeth in each jaw, behind which, in the upper, is a narrow band of villiform ones.

Anterior dorsal fin sustained by nine or ten spines. Anal fin with the second anal spine more than two-thirds as long as the longest branched ray. Caudal fin subtruncated.

Lower pharyngeal bones combined form a lanceolate, or very deeply ex-

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cavated triangle; each separately is semi-claviform. Their upper surface is covered with small teeth, and along the internal margin with a row of scarcely recurved more elongated ones. The upper pharyngeals are also clothed with small teeth, besides which, on the median bone, are conical ones like those of the lower bones. The first branchial arch is externally furnished with compressed setæ, which are mucronated on their internal borders; internally, they have transverse thick ridges with villiform teeth, like those of the other arches; the external rows of ridges are larger than the internal.

The scales of this genus are arranged in much less oblique lines than in most of the other representatives of the subfamily of *Sciæninæ*. An oblique row in the typical species extends from the commencement of the second dorsal to that of the anal.

This genus has been established for the *Perca argyroleuca* of Dr. Mitchell, or the *Corvina argyroleuca* of Cuvier and Valenciennes, and the allied species chiefly found in the Caribbean and neighboring seas. The *Homoprion xanthurus* of Holbrook, or *Homoprion subtruncatus*, perhaps belongs to this genus also, but as it is said to have "two or three series of small, pointed, recurved, card-like teeth, with an outer row of larger, conical, pointed teeth" in both jaws, it is not deemed advisable to positively place it there. The specimens referred to under that name by Dr. Girard, in the "Report on the Ichthyology of the Mexican Boundary Survey," as preserved in the Smithsonian Institution, belong to the *Bairdiella argyroleuca*. We have examined five of the specimens labelled as *Homoprion xanthurus*, and have counted the number of rays of the second dorsal fin. There are one spinous and twenty or twenty-one articulated rays, the last of which is double. They therefore agree in the number of rays, as well as in appearance, with the *Bairdiella argyroleuca*. The *Homoprion subtruncatus* has thirty-two articulated dorsal rays. A variation equalling a third of the greatest number of rays is rarely found in the same natural genus. Yet there is a very close resemblance between that species and the type of *Bairdiella*. It certainly shows much more affinity to the latter externally than to the *Homoprion lanceolatus*.

This genus is less nearly allied to *Corvina*; it differs in form, squamation and the dentation of the margin of the preoperculum. The genus *Stellifer* of Cuvier is founded on the *Bodianus stellifer* of Bloch, a species supposed to belong to this group, but which cannot be positively identified.

Type. *Bairdiella argyroleuca* Gill.

*Syn.* *Bodianus argyroleucus* Mitchell.

*Corvina argyroleuca* Cuv. et Val.

#### Genus CORVINA Cuv.

*Corvina* Cuv., Regne Animal, ed. ii. vol. ii. p. 173. 1829.

Body oblong rhombo-ovate, with the ante-dorsal region slightly curved, and thence declining in a straight line to the snout. The subdorsal region declines with a slight curve backwards.

Head oblong, with the snout rather high and truncated. The profile is straight and rapidly declivous. Eyes anterior, subcircular. Preoperculum scarcely dentated; mental pores well developed. Mouth subterminal and nearly horizontal. Supramaxillary bones well exposed and terminating before the hinder border of the orbit.

Teeth in a moderate band in each jaw; that of the upper preceded by a row of larger ones.

Anterior dorsal fin with about ten spines; the second long. Second anal robust.

The variable teeth of the lower and median upper pharyngeal bones are

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short, cylindro-conic and very blunt. The setæ are normal. The dentiferous plates of the arches developed as thick compressed ridges.

The scales of the head are mostly cycloid.

Type. *Corvina nigra* Cuv.

#### Genus RHINOSCION Gill.

*Ambledon* sp. *Girard*, Explorations and Surveys for a Railroad Route, &c., vol. x. Fishes, p. 98.

Body oblong, with the ante-dorsal region convex, and the occipito-nasal profile nearly straight.

Head oblong, with the snout slender and protuberant, and the profile nearly straight. Eyes anterior and subcircular. Preoperculum scarcely dented. Mental pores developed. Mouth inferior. Supramaxillary bones only partially concealed, not reaching to the posterior borders of the eyes.

Teeth in a band in each jaw, preceded in the upper especially by a row of larger ones.

Anterior dorsal fin with ten spines; second anal spine robust.

The variable teeth of the lower pharyngeal bones are cylindro-conic; those of the median upper ones acutely conic and curved. The setæ of the first ceratohyals are normal. The dentiferous plates of the arches very thick and not compressed.

The scales of the cheeks are ctenoid like those of the body.

Type. *Rhinoscion saturnus* Gill.

*Syn.* *Ambledon saturnus* Girard.

#### Genus JOHNIUS Bloch.

*Johnius* Bloch, Ichthologie ou Hist. Nat. Générale et Particulière des Poissons, vol. x., p. 107.

*Corvina* sp. *auct.*

Body elongated, with the dorsal outline arched, gradually descending from the dorsal to the snout, and slowly declining with a gentle curve from the commencement to the end of the dorsal fins. Abdominal outline scarcely or slightly convex.

Head oblong, with the profile oblique, the muzzle convex and protuberant, and the lower jaw scarcely ascending. Eyes of moderate size, anterior to a vertical line dividing the side of the head into two halves. Preoperculum with its vertical and horizontal margins finely denticulated. Two lateral pores evident, and often one or rarely two symphyseal ones present. Mouth slightly oblique and subterminal. Supramaxillary bones moderately hiding under the suborbital, extending to about the vertical of the posterior borders of the orbits.

Teeth cardiform, in a band on each jaw, and in the upper one preceded by a row of stronger curved ones.

Anterior dorsal fin provided with nine or ten spines. Anal fin with its second spine about half as long as the succeeding soft ray. Caudal fin generally entire or with its submedian rays extended.

The variable teeth of the lower and median upper pharyngeal bones are cylindro-conic. The setæ of the first pair of ceratohyals are normal; the dentiferous plates of the branchial arches are thick ridges.

The assumed North American representative of this genus may possibly not be congeneric with its type, but as no specimens are accessible, and as the figure of Bloch and the description of Cuvier and Valenciennes are not sufficiently exact and detailed to enable us to decide, it is for the present retained here.

Type *Johnius carutta* Bloch.

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## Genus MENTICIRRHUS Gill.

*Sciæna* sp. *Linn.*, &c.

*Umbrina* sp. *Cuv.*, *Regne Animal*, ed. i. vol. ii. p. 297.

Body elongated, with the dorsal outline arched, very gradually descending from the dorsal to the snout, and slowly descending to the end of the second fin. Abdominal outline nearly straight.

Head rather elongated, with the profile oblique, and before the eyes slightly arched. Snout convex and considerably protuberant. Eyes of moderate size, situated entirely in the anterior half of the head. Mouth horizontal and inferior. Supramaxillary bone ending nearly under the posterior border of the eye's pupil, chiefly concealed under the suborbitals. Preopercular margin finely denticulated. Lower jaw with a single barbel, with a pore in front, and with two lateral pores on each side.

Teeth in both jaws villiform; in the upper one, the band of villiform ones is surrounded by a row of larger curved ones.

Anterior dorsal fin sustained by ten or twelve spines, the third of which is frequently more or less prolonged. Anal fin generally with only one very slender spine. Caudal unequally lobed, with the inferior lobe convex and largest. Pectoral fins pointed and scaly at their bases. Ventral shorter and inserted much behind the pectoral.

The teeth of the pharyngeal bones are elongated and conical. The setæ of the first pair of ceratohyals are generally obliquely compressed and short. The dentiferous plates of the branchial arches are thick and ridge-like.

The American *Umbrinæ* form a very natural group, distinguished from the typical species by their elongated and very gradually tapering head, the more slender body, the more unequally emarginated caudal, the inferior insertion of the pectorals and their scaly bases, and the posterior origin of the ventrals, as well as the presence of only one very slender anal spine.

Type. *Menticirrhus alburnus* *Gill.*

*Syn.* *Umbrina alburnus* *Holbrook.*

## Genus UMBRINA Cuv.

*Umbrina* *Cuv.*, *Regne Animal*, ed. i. vol. i. p. 297. 1817.

Body moderately elongated, with the ante-dorsal region moderately curved, and the occipito-nasal profile declining quite rapidly.

Head oblong, with the snout thick and protuberant. Eyes mostly anterior. Mouth almost horizontal. Supramaxillars mostly retractile under the suborbitals, ceasing near the vertical of the posterior border of the pupil. Preopercular margin finely denticulated.

Teeth villiform; the band of the upper jaw encircled by a row of larger ones.

Anterior dorsal fin with about ten spines. Anal with two spines; the second of which is of moderate size. Ventral fins nearly under or little behind the bases of the pectorals.

The variable teeth of the lower and median upper pharyngeal bones are cylindro-conic. The setæ are of normal form but short; the dentiferous plates of the rest of the branchial arches ridge-like.

Type. *Umbrina cirrhosa* *Cuv.*

## Genus MICROPOGON Cuv.

*Perca* sp. *Linn.*

*Umbrina* sp. *Desmarest.*

*Sciæna* sp. *Quoy and Gaimard.*

*Micropogon* *Cuv. et Val.* *Hist. Nat. des Poissons*, vol. v. p. 213.

[April,

Body moderately elongated, compressed, quite high and convex at the commencement of the dorsal, and thence declining in a slightly arched line to the snout, and under the second dorsal in a straight descending line. Abdominal outline nearly straight.

Head oblong, rapidly declining downwards, and below nearly straight. Snout subtruncated or convex; little protuberant. Eyes moderate, entirely anterior. Suborbital region quite high. Preoperculum dentated behind, more coarsely towards the angle, where there are two larger distant radiating teeth. Each ramus of the lower jaw with a small row of minute filaments, and the two lateral pores. A very small median symphyseal pore present.

Mouth inferior, nearly horizontal. Supramaxillary bones extending to the posterior border of the pupil, and chiefly received under the suborbitals.

Teeth villiform in both jaws, and with an exterior row of larger ones in the upper.

Anterior dorsal fin with ten spines. Anal fin with the second spine moderate and about half as long as the succeeding ray.

The variable teeth of the lower and median upper pharyngeal bones elongated cylindro-conic. The dentiferous laminae of the branchial arches compressed, and with a row of larger and much curved teeth on their ridges, decreasing in size to their free ends.

Type. *Micropogon costatus* *Dekay*.

*Syn.* *Bodianus costatus* *Mitchill*.

*Micropogon lineatus* *Cuv. et Val.*

#### Genus PACHYPOPS Gill.

*Micropogon* sp. *Müll. and Troschel*, in Schomburgk's Reisen in British Guiana, (pt. iii.) p. 622. 1848.

Body moderately elongated, highest under the first dorsal, declining towards the snout, and under the second dorsal descending in nearly straight direction. Abdominal outline nearly straight.

Head oblong, with the snout convex and projecting. Eyes large, longitudinally elliptical and with a vertical pupil, partly in the posterior half of the head. Suborbital region of moderate height, much swollen and translucent. Preoperculum finely dentated behind and at its angle. Chin with three barbels. Pores small.

Mouth small, inferior and horizontal. Supramaxillary bones entirely concealed under the suborbitals.

Teeth all villiform in a band on each jaw.

Anterior dorsal fin with ten spines. Anal with its second spine robust, and nearly as long as the succeeding branched ray.

The variable teeth of the lower and those of the median upper pharyngeal bones are cylindro-conic. The setae of the first ceratohyals are normal. The dentiferous laminae of the arches are thick and ridge-like.

Type. *Pachypops trifilis* *Gill*.

*Syn.* *Micropogon trifilis* *Müll. and Troschel*.

This species appears to have some affinity to the fish called by Cuvier and Valenciennes *Corvina Fureræa*, but that species has apparently no barbels; they could scarcely have been overlooked if they had been present, for the minute pores of the chin are described.

#### Genus GENYONEMUS Gill.

*Leiostomus* sp. *Ayres*, Proceedings California Academy of Natural Sciences, vol. i. p. 25. 1855.

Body elongated, nearly equally convex above and below, with the dorso-nasal profile nearly straight.

Head oblong-conical, with the snout abruptly truncated. Eyes moderate, 1861.]

entirely anterior. Suborbital chain twice as long as wide. Preopercular margin with no true spines, but membranous and crenulated by small flexible spiniform processes. Each ramus of the lower jaw internally provided with several small filaments, and with two distinct pores. Symphyseal pore or pores minute.

Mouth subterminal, slightly oblique. Supramaxillary bones almost concealed under the suborbital, extending to the vertical of the hinder border of the pupil.

Teeth equal and villiform in a band in each jaw.

Anterior dorsal fin provided with about thirteen slender spines. Anal fin with its second spine short and feeble. Caudal emarginated.

The pharyngeal bones and branchial arches are essentially the same as those of the true *Micropogon*.

While the type of this genus possesses the filaments of the lower jaw, characteristic of *Micropogon*, it is distinguished eminently by the form of the head and body, and the absence of true armature of the preoperculum. The form is very characteristic, and its style perhaps resembles that of the true *Liostomi* as much as any other, although it is much more elongated.

Type. *Genyonemus lineatus* Gill.

*Syn.* *Leiostomus lineatus* Ayres, Girard.

The following is a revised catalogue of the representatives of the subfamily Sciæninæ as now restricted, which are found on the eastern coasts of North America :

Genus CYNOSCION Gill.

- *Cynoscion regalis* Gill.
- Otolithus regalis* Cuv.
- Cynoscion caroliniensis* Gill.
- Otolithus caroliniensis* Cuv. et Val.
- Cynoscion thalassinus* Gill.
- Otolithus thalassinus* Holbrook.
- Cynoscion nothus* Gill.
- Otolithus nothus* Holbrook.

Genus HOMOPRION Holbrook.

- Homoprion lanceolatus* Holbrook.
- Homoprion subtruncatus\** Gill.
- Leiostomus xanthurus* Cuv. et Val.
- Homoprion xanthurus* Holbrook.

Genus BAIRDIELLA Gill.

- Bairdiella argyroleuca* Gill.

Genus JOHNIUS Bloch.

- Johnius ocellatus* Girard.
- Corvina ocellata* Cuv. et Val., Storer.

Genus MENTICIRRHUS Gill.

- Menticirrhus alburnus* Gill.
- Umbrina alburnus* Holbrook.
- Menticirrhus nebulosus* Gill.
- Umbrina nebulosa* Cuv.
- Menticirrhus littoralis* Gill.
- Umbrina littoralis* Holbrook.

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\* As previously mentioned, the *Homoprion subtruncatus* does not appear to belong to the genus *Homoprion*, but not having seen specimens, we do not yet feel justified in referring it to any other.

## Genus MICROPOGON Cuv.

*Micropogon costatus* DeKay.*Micropogon lineatus* Cuv. et Val.*Micropogon undulatus* Cuv. et Val.

From the western coasts of North America, three species are at present known:

## Genus RHINOSCION Gill.

*Rhinoscion saturnus* Gill.*Ambledon saturnus* Girard.

## Genus MENTICIRRHUS Gill.

*Menticirrhus undulatus* Gill.*Umbrina undulata* Girard.

## Genus GENYONEMUS Gill.

*Genyonemus lineatus* Gill.*Leiostomus lineatus* Ayres, Girard.

## On the LIOSTOMINÆ.

BY THEODORE GILL.

In the fourth volume of the original edition of the "Histoire Naturelle," Lacépède has described and figured, from the manuscripts of Mr. Bosc, a single species of fish, for which he formed a new genus, on which he bestowed the name of *Leiostomus*. The genus in that work is defined as follows:—

"Les mâchoires dénuées de dents, et entièrement cachées sous les lèvres; ces mêmes lèvres extensibles; la bouche placée au-dessous de museau; point de dentelure ni de piquants aux opercules; deux nageoires dorsales."

In the first edition of the "Règne Animal," Cuvier expressed a belief that the species on which that genus was founded should be referred to *Sciæna*,\* and in his second edition, referred it, as well as the *Labrus obliquus* of Mitchell, † to the subgenus *Johnius* of Bloch.

In the fifth volume of the "Histoire Naturelle des Poissons," the genus *Leiostomus* was adopted, but was simply distinguished by the small size of the anal spine, the feebleness of the "dentelures" of their preoperculum, and the very fine teeth of the jaws." The latter were said to be so fine, that different observers had not perceived them, and that Lacépède had therefore, always confiding in the assertions of others, made of one of the species referred to the group a peculiar genus, called *leiostomus*, or smooth mouth. ‡ The pharyngeal bones were further stated to have paved teeth on their posterior borders. To the genus thus defined were referred two species; the first was described as *Leiostomus humeralis*, and regarded as identical with the *Labrus obliquus* of Mitchell; the second as the *Leiostomus xanthurus* of Lacépède. The two species are distinguished only on account of the greater convexity of the nape and the absence of bands and spots in the latter. The teeth of *Leiosto-*

\* Je ne doute pas que le *leyostome queue jaune*, Lac., iv. x. i. ne doive aussi être rapproché de ce sous-genre (*Sciæna*)," l. c., vol. ii. p. 298.

† This was called *Johnius humeralis*, Cuv., and was regarded as probably identical with the *Perca undulata* of Linnæus, which last was afterwards, with more propriety, identified with the species now called *Micropogon undulatus*.

‡ The *Leiostomus obliquus* has a band of very fine teeth in the upper jaw, which have been overlooked by Bosc.

*mus xanthurus* are said to be villiform, in a very straight band, and scarcely perceptible, so that they had been stated to be absent. It is moreover affirmed that M. Bosc, who had furnished to M. Lacépède the figure and notes on which that naturalist had established the *Leiostomus xanthurus*, had sent for examination to Cuvier and Valenciennes the fish itself.

Cuvier and Valenciennes having thus stated that both of the *Leiostomi* were provided with teeth on each of the jaws, Dr. Dekay, in his "New York Fauna," and Dr. Storer, in his "Synopsis," followed them. Dekay, in his diagnosis of the genus, not daring to disagree with Cuvier, describes the "teeth in the jaws, even and excessively small," and "very minute denticulations on the preoperculum;" in the description of his *Leiostomus obliquus*, Dekay again states that the teeth are "so minute as to be visible only with a lens," and that the preoperculum is "minutely denticulate." Dr. Storer adopted the generic diagnosis formulated by Dekay.

Dr. Holbrook subsequently framed for a new species and the *Leiostomus xanthurus* of Cuvier and Valenciennes, and their copyists, a new genus, called *Homoprion*, remarking at the same time that the latter was "certainly the fish for which Lacépède established his genus *Leiostomus*." Notwithstanding this statement, he has retained the name of *Leiostomus* for the *Leiostomus humeralis* of Cuvier and Valenciennes, or *Leiostomus obliquus* of the Americans, thus assigning Lacépède's name and authority to a genus with which that naturalist must have consequently been believed to be unacquainted. The genus thus restricted was characterized by the "preopercle smooth or without serratures; intermaxillary teeth minute; posterior pharyngeal teeth paved." The *Homopriontes*, on the other hand, had "small, villiform, card-like teeth in both jaws; upper jaw with an external row of larger, conical and pointed teeth; pharyngeal teeth not paved; preopercle with large radiating serratures or spines at its angle.

We now revert to the description of the *Leiostomus xanthurus* given by Lacépède. That description may be divided into two portions: one relates to form and external anatomical or permanent characters; the other to color, which is evanescent and liable to alteration.

The zoological characters are as follows, the order being regulated by their respective value:

- 1st. Les machoires dénuées de dents, et entierment cachées sous les lèvres.
- 2d. Point de dentelure ni de piquants aux opercules.
- 3d. Le bout du museau est mousse.
- 4th. La caudale échancrée en croissant.
- 5th. Dix rayons à la première nageoire du dos.

In all of these respects, the species of Lacépède agrees with *Leiostomus obliquus* of the American naturalists, and not with the one named by Cuvier and his followers *Leiostomus* or *Homoprion xanthurus*. That species has

- 1st. Well developed teeth on both jaws.

2d. "Large radiating serratures or spines" at the angle of the preoperculum.

- 3d. The muzzle scarcely blunt.

- 4th. The caudal fin "entire or slightly longest in the middle."

- 5th. Eleven spines supporting the first dorsal fin.

The *Leiostomus obliquus* agrees then with the species described by Lacépède in all the anatomical peculiarities mentioned,\* and by the same characters is the *Leiostomus xanthurus* of Cuvier distinguished from it.

What then are the reason that have induced almost all naturalists to refer Lacépède's description to the latter fish?

In the first place, the color may be urged as a reason.

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\*Lacépède mentions that his species has often only about a decimetre in length, and then its greatest height is nearly four centimetres. The proportions so indicated also best correspond with the *Leiostomus obliquus*.

Lacépède describes the color of his species thus :

“ Il a en effet la nageoires de la queue ainsi que les autres nageoires, jaunes ou jaunâtres ; elles sont d'ailleurs pointillées de noir. Une couleur brune argentine règne sur la partie supérieure de l'animal, et un blanc argenté sur l'inférieure. L'iris est jaune.”

This description, it must be confessed, is more applicable to the so-called *Homoprion xanthurus* than to the *Leiostomus obliquus*, especially that part which refers to the silvery whiteness of the lower parts. But it also equally applies to an individual of the latter species, whose bands and humeral spot have faded, and whose scales have been rubbed from the belly, as is frequently the case with old, dried or alcoholic specimens.

Bosc, while taking his description and figure of the species from a dried or preserved specimen of the *Leiostomus obliquus*, from which the bands and humeral spot had disappeared, to complete the description of the color, may possibly have had either recourse to a fresh specimen of the “yellow tail,” or *Homoprion xanthurus*, which was casually and separately examined, or perhaps relied partly on the description of another. At most, the description of the coloration is the *only documentary evidence* to which we can appeal in support of the views of the identity of the *Homoprion xanthurus* with *Leiostomus xanthurus*. Appeal must be then made to other sources.

As already mentioned, Cuvier and Valenciennes have informed us that Bosc had sent to them the same species as that described by Lacépède.\* This statement may be thus explained.

The specimen whose anatomical characters were described and figured by Bosc, could not have been the one sent ; that forwarded was believed to belong to the same species as the one described, on account of the identity of popular names. The original, with the color faded, had probably been pronounced to be the “yellow tail.” The statement was doubtless accepted as true, and no comparison made to ascertain whether such was the case. A demand having been afterwards made for a specimen of the species described, one of the true “Yellow tail” was obtained and sent as belonging to it, reliance being placed on the correct application of the popular names. This theory is assumed, as it is deemed to be inadmissible to go behind the description to such a position, when the description and specimen so strongly conflict, and when that description is so applicable to a common species found in the same regions. It is not stated that the *type* of Bosc's original description and figure was sent. The name of *Leiostomus* is therefore retained for the species without teeth on the lower jaw, and with an entire preoperculum.

While it may be admitted that the name of *Leiostomus* can be retained for the genus, it may be still questioned whether the specific name can be accepted.

As the description, so far as it goes, is applicable to the *Leiostomus obliquus*, and the fault is simply due to an omission of mention of the oblique bands and the humeral spot, which are frequently faded, we are of the opinion that the specific name must be also retained.

Cuvier and Valenciennes' assignation of teeth to both jaws of the *Leiostomus humeralis* can be only explained on the supposition of their belief in the universality of the characters of dentition, and their conclusion that the species must have teeth because apparently nearly allied ones had.

The rest of the description and the radial formula are more applicable to that species which has been called by the same name by subsequent naturalists, or the *Homoprion xanthurus* of Holbrook.

Can the specific name of *xanthurus* be retained for the species described under that name ?

\*“ M. Bosc, qui avait fourni à M. de Lacépède le dessin et la note dont il a tiré son article, a bien voulu nous donner le poisson lui-même, et nous sommes ainsi assurés de l'es pièce.”

We consider that it would be wrong to do so, although the species belongs to a different genus from the *Leiostomus xanthurus* of Lacépède. The name of Lacépède was adopted for that species under an erroneous impression, and that of *Homoprion xanthurus* was applied with the express understanding that it was "certainly the fish for which Lacépède established his genus *Leiostomus*." It has been demonstrated that documentary evidence does not support this assertion. The retention of the name of Holbrook would therefore perpetuate an error; the name of *Homoprion subtruncatus* has been consequently offered as a substitute in the "Catalogue of the Fishes of the Eastern coast of North America."

There has been recently referred to the genus *Liostomus*, a fish found on the coast of California. It has been called by Dr. W. O. Ayres, *Leiostomus lineatus*, and again described and figured from nature by Dr. Girard, under the same name.

After a perusal of the description of that species, it is evident that it does not belong to the genus *Liostomus*, but, from its imperfection, it remains doubtful to what genus it really should be referred. A cursory examination would remind the naturalist of the *Johnii*, but on a more careful investigation, all the teeth of the upper jaw are found to be small and equal, and several small but distinct *barbels* are discovered along the inner margin of each limb of the lower jaw. The genus *Micropogon* is therefore at once suggested, but the species differs from the other representatives of that genus in the armature of the preoperculum, the form of the caudal fin and the number of rays in the dorsal and anal. It consequently appears to belong to a different genus, to which no name has yet been given. The name of *Genyonemus* may be therefore bestowed on it.

Agreeing, therefore, with Holbrook, and removing the *Leiostomus xanthurus*, of Cuvier and Valenciennes from the genus, and having shown that the *Leiostomus lineatus* of Ayres and Girard is to be also excluded, the type of the genus is the only species yet known. That single species can at once be distinguished from all other Scienoids by its peculiar form and *tout ensemble*. That peculiarity of appearance is also coincident with most important anatomical characters which indicate that the relations of the species are far less intimate with other genera than has been supposed. Those characteristics are of such a nature as appears to necessitate the establishment of a distinct subfamily for the *Liostomi*. The name of *Liostomine* is therefore now conferred on it. The diagnoses of the subfamily and genus will be given.

#### Subfamily LIOSTOMINÆ Gill.

The body is compressed and subovate, covered with ctenoid scales. The lower jaw is received within the upper. Teeth are present only in the upper jaw.

The first dorsal fin commences over or before the bases of the pectorals, and is longer than high. The ventral fins are inserted under or slightly behind the pectoral.

The lower pharyngeal bones when united present a hastate form; the external sides are incurved or emarginated; they are contiguous to each other for the whole of their internal sides; from the apex of the basal emargination, they are curved outwards or convex. Each bone is thickest behind, and there is a high marginal or submarginal ridge which is most elevated towards the posterior third.

The upper pharyngeal bones of each side are only two in number; the anterior is semi-oval, and is emarginated to receive the posterior, which is of an irregular ovoid form, and larger than the anterior.

The teeth of the pharyngeal bones are not conical.

The setæ of the ceratohyals of the first pair of branchial arches are of moderate length.

[April,



Genus *LEIOSTOMUS* Lacépède.

*Leiostomus Lacépède* Hist. Nat. vol. iv. p. 439.

*Leiostomus Holbrook*, Southern Ichthyology, p. 21. 1847.

Body subovate, compressed, highest under the first dorsal. Abdominal outline less arched than the dorsal.

Head short, with the fronto-occipital region very oblique, and the snout high, subtruncated, and slightly convex. Eyes rather large, and mostly or wholly anterior. Suborbital region high.

Mouth small, scarcely oblique. Supramaxillars terminating under the pupils, and mostly retractile under the suborbitals.

Teeth in a villiform band in the upper jaw; entirely absent in the lower.

Preoperculum broadly rounded and entire, but with an apparently crenulated membranous margin. Lateral and symphyseal pores present.

Anterior dorsal fin sustained by ten spines. Anal with its second spine short and weak. Caudal emarginated.

The lower pharyngeal bones are furnished internally near their interno-posterior margins with several rows of more or less truncated and excavated molar teeth; their other teeth are elongated and compressed, most slender near their bases, curved with a sigmoid flexure. Their terminal portions especially are of a burnt brown or blackish color.

The posterior of the upper pharyngeal bones are also paved internally near their ends with several rows of molars like those of the lower bones. The rest of the posterior and the whole of the anterior pharyngeals are provided with elongated, compressed teeth, most slender below, sigmoidally curved, and with a constriction a short distance from the tip, which gives the apex an unguiform aspect.

The setæ of the first pair of ceratohyals are furnished with nearly colorless and very slender teeth; the dentiferous laminae of the rest of the branchial arches are compressed, and their margins armed with slender, deeply colored teeth like those of the lower pharyngeal bones.

The elongated teeth of the longer pharyngeals and the branchial arches have some resemblance to the teeth of the pharyngeal bones of Cyprinoids, called by Heckel raptatorial, ("dentes raptatorii") but are much more slender, especially at the base.

Type. *Leiostomus xanthurus* Lac.

*Syn.* *Leiostomus humeralis* Cuv. et Val.

*Leiostomus obliquus* DeKay.

On the identity of the Genera **NEOMÆNIS** of Girard, and **LUTJANUS** of Bloch.

BY THEODORE GILL.

In the Ninth Annual Report of the Smithsonian Institution, a species of fish has been described and referred to the genus *Lobotes*, under the name of *Lobotes emarginatus*. A few specimens of the species were taken in August, among the grass along the banks of Egg Harbor river at Beesley's Point.

Subsequently, Dr. Charles Girard, in his Report on the Ichthyology of the United States and Mexican Boundary Survey, framed for the species a new genus, to which he gave the name of *Neomænis*, and which he referred to the family of Mænidae.

On an examination of the description and figures given in that Report, it was evident that the species did not belong to either the families of Sciaenoids or Mænoids, as those groups have been characterized by Cuvier, and accepted by almost all subsequent naturalists. It appeared to belong to the genus *Mesoprion*, of the family of Percoids, but as no description was given of the ex-  
1861.]

tent and character of the squamation, it was impossible to arrive at a certain conclusion without further evidence.

The specimens preserved in the Museum of the Smithsonian Institution were afterwards searched for and found, and it was then discovered that they certainly belonged to the genus *Mesoprion*, as defined by Cuvier.

None of the descriptions of the various species of that genus, and especially of those found in the West Indies, were found to apply to the species in question, and it appears quite distinct. The specific names, although applicable to all the typical representatives of the genus, must be then retained, and after reference to its proper genus, it will assume the name of *Lutjanus emarginatus*. The genus *Lutjanus* having been founded on allied species, and its first representative being a true *Mesoprion* of Cuvier, the former name takes precedence of the latter.

In the "Catalogue of the Fishes of the Eastern Coast of North America," the *Neomænis emarginatus* has been adopted with that name, and referred to the subfamily of *Lobotinæ*, and the family of *Pristipomatoids*. Neither the specimens on which the species was founded, nor the Report of Dr. Girard were at hand when the list of the *Pristipomatoids* was compiled, and the author relied on the original description, where only the form and coloration were mentioned. A simple note had been made in the margin that the genus *Neomænis* had been established by Girard for it, and as it evidently did not belong to *Lobotes*, that name was adopted. As it had been referred to *Lobotes*, it was presumed that there was a strong likeness to the species of that genus, and it was consequently referred to the subfamily of *Lobotinæ*; as, however, the form was described as "elongated subfusiform," and the caudal as "emarginated posteriorly," and as the color resembled that of some of the species of *Hæmulon*, the genus *Neomænis* was supposed to form a passage from the *Lobotinæ* to the *Pristipomatinae*.

It is worthy of note that Dr. Bleeker has also made a mistake similar to that committed by the North American naturalists. In the *Natuurkundig Tijdschrift voor Nederlandsch Indië*, he has first described a fish as *Dentex pristipoma*, for which he afterwards formed a new genus, and called the species *Pristipomoides typus*, and which he subsequently referred to the genus *Mesoprion*, to which it appears to truly belong. Dr. Günther has retained the genus *Pristipomoides* in his Catalogue of the *Acanthopterygian Fish*, having probably overlooked the correction by Dr. Bleeker of his error.

The history of those fishes is interesting, as it is evident that when such excellent and celebrated naturalists have referred representatives of the Percoid *Lutjani* to different genera of *Pristipomatoids*, the distinction between the family of Percoids and *Pristipomatoids* must be very slight.

There is indeed the strongest resemblance between the *Lutjani*, *Pristipomatinae* and *Sparoids*; and the typical Percoids, *Pristipomatoids*, *Sparoids* and *Pimelepteroids* will perhaps be found to belong to one true family.

At the time of the compilation of the Catalogue of the Fishes of the Eastern Coast, we were aware of the affinity of those families, but adopted some of them in deference to other authors, and others to make of more nearly equal value the different groups. It was intended to restrict the name of Percoids to those fishes which have the aspect of *Perca* and *Serranus*, whose vomerine and palatine bones are provided with acute teeth, and whose jaws have acuminate ones; the palatine teeth are rarely absent.

The *Pristipomatoids* included those fishes whose jaws are moderately protractile, and furnished with acute teeth; the palatine arch is edentulous. The form is exemplified in *Hæmulon*. The *Sparoids* have a dentition which is well described by Günther—"Either trenchant teeth in front of the jaws, or lateral series of molar teeth." The *Pimelepteroids*, included by Günther among the *Sparoids*, were regarded as forming a distinct family, characterized by the trenchant teeth in front of the jaws, the presence of palatine teeth, and the dense squamation of the vertical fins. The *Sparoids* consequently embraced only those whose palatine arch was unarmed. There is between many of the

forms thus brought together a strong likeness, but yet there are others which, in almost all anatomical and zoological characters, show a greater affinity to species that by those principles of classification would be referred to distinct families. While the above mentioned families are therefore for the present retained, it is with the understanding that such is done simply because our knowledge of the true principles of classification is not sufficiently perfect, and not because they are believed to be founded in nature. The typical Percoids, Pristipomatoids, Sparoids and Primelepterooids, appear, for example, to be as nearly allied to each as are the Rhyptici to the Percoids. They cannot be distinguished by any character except the dentition; and characters drawn from that alone, important as it is in many cases, can scarcely of itself be sufficient to establish family groups. It is probable that all of those fishes will hereafter be united, and quite a different distribution of the genera be adopted.

### Notes on the Habits of APHREDODERUS SAYANUS.

BY CHARLES C. ABBOTT.

If we except the knowledge of this fish's existence, nothing seems to be known concerning it; though few of our fluviatile species have a greater geographical distribution, or are more numerous in many extended and widely separated localities. At Camden, New Jersey, this species abounds in immense numbers; during spring, in schools, similar in size and general appearance, to the young of *Ambloplites De Kayi* or *atrarius*; in summer and autumn remaining in pairs generally, though often in companies of from five to nine; in winter scattered irregularly through the streams; each seeking shelter, and generally more than half burying themselves in the sand; though to clay or plastic mud they seem to have a great aversion.

The *Aphredoderus* is most strictly carnivorous, and appears to delight in the unnecessary destruction of all malacopterygian fishes, not excepting its own species, if they be too weak to withstand its attacks. Immature cyprinoids are its favorite food, though the *Melanura annulata* is chiefly its victim. Being strictly nocturnal in its habits, little opportunity is offered to learn its peculiar mode of capturing its prey, but from the fact of often finding the tail of a cyprinoid projecting from the jaws of the *Aphredoderus*, and from the position in which the author has universally found the prey, when specimens were dissected, there is little doubt that "head foremost" is the usual fashion. The dentition is not of such character as to lead to the idea of extreme carnal propensities of the species in question; and yet it may be doubted if any fluviatile species is more so, if we except the *Belone longirostris*. The pikes we know are strictly carnivorous, but there is no instance in our memory of that fish destroying others for the mere sake of destruction. Three specimens living, a few months since, in the aquarium of the Academy, were attentively watched by the author, and in the space of eleven days they had destroyed twenty-seven black-nosed dace, (*Argyreus atronotus*), and by continued worrying succeeded in the destruction of a mud sun-fish, (*Ambloplites pomotis*,\*) nearly quadruple their size.

From the comparison of specimens from different localities, it is highly probable that two species may be detected. The author has taken specimens near Philadelphia, exactly coinciding with Gilliam's description, but varying in the general tint of the body, and in the want of the white margin of the caudal fin. On examining specimens from Cedar Swamp Creek, N. J., taken by Prof. S. F. Baird, and the originals of his description, in his Report of the

\*This fish was first described by Baird, as *Centrarchus pomotis*; but is congeneric with *Ambloplites rupestris* Gill, and must be so referred.

*Ambloplites pomotis* Abb.

*Centrarchus pomotis* Baird, Ninth Smith. Rep. p. 325.

Fishes of the New Jersey Coast, they were found to differ from those found more inland, taken at Trenton, N. J., but coincided with the original diagnosis; there are at least two varieties, one characterized by their larger size, chocolate brown color of the body, and unmarked caudal, the other, much smaller, nearly black, with a white margin to the caudal fin, wider at the angles and lost near the centre of the posterior edge of the fin.

No opportunities have as yet been offered to see the spawning of this species; but that it guards its ova as the *Pomotis maculatus*,\* Gill, is highly probable. The ova in all probability are deposited very early in March, in the latitude of Philadelphia, as very young specimens were taken by the author on the third of the present month. The young were swimming in loose shoals, and were accompanied by a number of adult specimens, who were guarding them from the ravages of the pike, (that they themselves might feast the better.)

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**Description of a new genus (STREPHOBASIS) of the family MELANIDÆ, and three new species.**

BY ISAAC LEA.

Family MELANIDÆ.

Genus STREPHOBASIS.

Testa cylindracea. Apertura subquadrata. Columella infernè incrassata et retro-canaliculata. Operculum corneum, instar spiræ.

The mollusk for which I propose this genus, was sent to me by Wm. Spillman, M. D., of Columbus, Mississippi, and I have before me over a dozen specimens from a third to nearly an inch in length. The very great number of species of the genus *Melania*, makes it desirable to eliminate any group with characters sufficiently distinct to permanently recognize it. The very remarkable retrose callus at the base of the columella, causing a lateral sinus, is characteristic of this genus.

STREPHOBASIS SPILLMANI.—Testâ lævi, cylindraceâ, crassiusculâ, vel tenebroso-fuscâ vel virente, valdè vittatâ, nitidâ; spirâ obtusâ, curtâ, ad apicem carinatâ; suturis irregulariter impressis; anfractibus supernè convexiusculis, ultimo constricto; aperturâ subgrandi, subquadratâ, intus cærulescenti et valdè vittatâ; labro acuto, sinuoso; columellâ sinuosâ, ad basim incrassatâ et retrò canaliculatâ.

*Hab.*—Tennessee River. Wm. Spillman, M. D.

STREPHOBASIS CORNEA.—Testâ lævi, cylindraceâ, crassâ, corneâ; spirâ obtusâ; suturis irregulariter impressis; anfractibus supernè convexiusculis, ultimo constricto; aperturâ rhombo-quadratâ, intus luteo-albâ; labro acuto, sinuoso; columellâ sinuosâ, ad basim incrassatâ et retro-canaliculatâ.

Operculum small, ovate, spiral, dark brown, with the polar-point near the base.

*Hab.*—Tennessee River. Wm. Spillman, M. D.

STREPHOBASIS CLARKII.—Testâ lævi, cylindraceâ, subtenui, luteo-corneâ, trivittatâ; spirâ valdè obtusâ, curtâ; suturis irregulariter impressis; anfractibus quinis, supernè convexiusculis, ultimo constricto; aperturâ subgrandi, quadratâ, intus albidâ, valdè vittatâ; labro acuto; columellâ sinuosâ, ad basim albâ, incrassatâ et retro-canaliculatâ.

*Hab.*—Tennessee River, at Chattanooga, Tennessee. Joseph Clark.

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\*The author has lately seen in a large aquarium, the *Bryttus chatodon* guarding its nest and eggs similarly to the manner of the common sun-fish. This may be a habit, characteristic of the family *Ichthelidæ*, as the *Ichthelis rubricauda* has often been noticed making its nest in May, after the manner of the type of the family, though invariably preferring deeper water, which may be a reason of its not having been generally noticed.

On the Marine Shells brought by Mr. Drexler from Hudson's Bay, and on the occurrence of a Pleistocene deposit on the Southern shore of James' Bay.

BY WM. STIMPSON.

Mr. Drexler, who last summer visited the south-eastern shores of Hudson's Bay, under the auspices of the Smithsonian Institution, has brought home some shells which it will be of interest to notice here, since nothing has been hitherto published upon the molluscan fauna of that region. The physical conditions of the bay do not seem to be favorable to any great development of true marine mollusks at the present day, though we have evidence of an abundance of deep-sea species at a former epoch. The waters of the bay are now mostly shallow and somewhat brackish.

Cape Hope, the point at which the marine shells were collected, is situated on the eastern side of James' Bay, in latitude about 52° 10' N. Only three species of these shells were found alive, but these occurred in great numbers, above low water mark. They were

*Mytilus edulis* L.

*Macoma fragilis* O. Fabr. (*T. grönlandica*.)

*Littorina grönlandica* Chemn.

The *Littorina* reaches a large size, (0.65 inch,) and is probably identical with *L. tenebrosa*. We cannot distinguish it from specimens from Greenland.

The following species were found dead at Cape Hope, perhaps washed out of some pleistocene deposit, as they are the characteristic species of that period.

*Rhynchonella psittacea* Ch.

*Pecten islandicus* Müll.

*Cardium islandicum* Ch.

*Astarte arctica* (Gray.)

*Astarte striata* (Leach.)

*Mya truncata* Lin.

*Admete viridula* (O. Fabr.)

The specimens of *Cardium* were much eroded on the outer surface, leaving sharp, distant, crenulated, concentric ridges, as in those from the pleistocene of Lake Champlain.

The southern part of James' Bay is so shallow that even small boats must go out of sight of land to find water deep enough to enable them to float at low tide. This part, called Hannah Bay, forms the embouchure of the Hannah river, in which Mr. Drexler collected many fresh water shells, chiefly elongated *Lymnææ*, and large *Planorbis*. In a box of these shells we found a considerable number of marine species, evidently fossils washed out of the river banks, indicating the existence there of an extensive marine pleistocene deposit. The following is a list of the species, which, with one exception, are deep water forms.

*Mytilus edulis* Lin.

*Nucula expansa* Reeve (*N. tenuis*.)

*Yoldia portlandica* (Hitch.)

*Ieda pernula* (Müll.)

*Macoma sabulosa* (Spengl.) (*T. proxima*.)

Of these, the *Yoldia portlandica* was most abundant, about twenty specimens being found, with valves united, among which there were forms exactly corresponding to *Y. siliqua* Reeve, which appears to be only a variety. This species is now found living in the Arctic seas, where it was dredged by Capt. Sir Edward Belcher. We may here remark that we have met with living examples of *Astarte*, exactly corresponding to *A. laurentiana*, so that none of the boreal pleistocene species yet found in North America can be regarded as extinct.

May 7th.

Mr. LEA, President, in the Chair.

Thirty-one members present.

Papers were presented for publication, entitled :

"On the Haplodonotinae," by Theo. Gill.

"On the Genus Anisotremus," by Theo. Gill.

And were referred to committees.

The report of Mr. E. Durand upon the collection of plants recently received from Dr. Lincecum, of Long-Point, Texas, in which he congratulates the Academy upon having acquired in Dr. Lincecum a zealous and useful correspondent, was read. The collection above referred to, of Texas plants, consists of 682 species or varieties, 540 of which are *Exogenous*, divided as follows : *Polypetalous*, 207 ; *Monopetalous*, 244 ; *Apetalous*, 84 ; *Gymnospermous*, 5. One hundred and forty are *Endogenous*, of which 106 belong to *Cyperaceae* and *Gramineae*. One *Equisetum* and one *Fern*.

Prof. Gill exhibited and described two new species of marine fishes. The type specimens of both are preserved in the Museum of the Academy, and said to have been obtained at Newport, Rhode Island.

The first is nearly related to the genera *Epinephelus* and *Hypoplectrus*. It differs from the former by the nudity of the superior surface of the head, the scales of the ante-dorsal region extending in front only to a semi-circular line whose convexity reaches little beyond the vertical of the ascending margin of the preoperculum. From *Hypoplectrus* Gill,\* of which the *Plectropoma puella* Cuv. et Val. may be considered as typical, it differs by the inferior armature of the preoperculum, which is similar to that of *Epinephelus*. The *Serranus scriba* has, also, the upper surface of the head naked, but its form is different ; what generic name is to be accepted for that species is perhaps doubtful.

The new species may be called

#### HYPOPTHODUS FLAVICAUDA.

The cheeks and opercula, as well as the supramaxillary bones, are covered with scales. The lower jaw is naked.

The preoperculum has at its angle a strong spine, which is itself more or less dentated ; its ascending margin is vertical and quite strongly serrated ; its horizontal inferior margin has also several more distant teeth. The operculum is armed with three spines.

The number of rays is indicated in the following formula :

D. XI. 14. A. III. 10. P. 17. V. I. 5.

The color of the body may be described as tawny, minutely punctulated with brown or black, which so prevail on the caudal peduncle, the dorsal, anal and ventral fins, that those parts are quite black. There are on each side four narrow lighter bands, along each of which are also about three light blue spots. The caudal and pectoral fins are yellowish. The articulated portions of the dorsal and anal exterior to a line continuous with the margin of the spinous portions are lighter, and also assume a yellowish hue. The first transverse line extends from the fifth or sixth spines of the dorsal to the axilla of the pectoral fin ; the second from the eighth dorsal spine ; the third from the eleventh ; the fourth from about the fifth articulated ray.

The species, on account of its coloration, resembles the *Hypoplectrus chlorurus* Gill, (*Plectropoma chlorurum* Cuv. et Val.,) as much as any other, but is

\* The genus *Hypoplectrus* is proposed for the *Plectropoma puella* and allied species of the Caribbean sea.

generically distinct, and a true *Serranus* Cuv. Two specimens were obtained at Newport, Rhode Island, by Messrs. N. and E. Smith. Both specimens are young, the length being less than two inches.

The second species noticed belonged to the genus *Sarothrodus*,\* and was perhaps most nearly related to a species of the West Indies recently described by Dr. Günther, under the name of *Chaetodon gracilis*. The new species was named

SAROTHRODUS MACULO-CINCTUS.

The dorso-nasal profile was less steep than that of the *Sarothrodus gracilis*. The course of the lateral line presented also a characteristic difference; it suddenly advances with a very slight curve to near the base of about the fifth articulated ray of the dorsal fin, and is then deflected, and runs under the base of the dorsal nearly to the end of that fin.

The fins are nearly similar in form to *Sarothrodus gracilis* and its allies. The third anal spine is not longer, or is even shorter than the second. The number of rays is expressed by the following formula :

D. XII. 18. A. III. 16. P. 15. V. I. 6.

The color of the body is yellowish, or whitish minutely dotted with black, ornamented with an anterior and posterior blackish brown band. The anterior separates in front of the dorsal, from its fellow of the opposite side at an acute angle, passes over the eye, and extends to the inferior margin of the interoperculum; it is narrower than the orbit. The posterior is as wide as the anterior, convex behind, and expands into a large darker spot on the basal half of the dorsal fin between the second and twelfth articulated rays, and into a similar one at the base of the anal between its first and tenth articulated rays. The peduncle of the tail behind the fins is of the same color as the rest of the body. The fins are dotted like the body; the ventrals very densely. The dorsal and anal fins have not a dark marginal or submarginal line.

This species is most nearly allied to the *Sarothrodus gracilis*,† but is readily distinguished by the number of rays and color. In that species, the posterior band passes over the caudal peduncle, covers the hinder part of the anal and dorsal fins, and is continued more faintly on the basal half of the entire articulated portion of the latter. The articulated portions of the dorsal and anal fins have a very narrow, light border, and on the former there is also a narrow submarginal blackish line.

A single young specimen, little more than an inch long, is in the Museum of the Academy, and was presented by Mrs. E. P. Mason.

The thanks of the Academy were tendered to Mr. Horatio C. Wood, Jr., for the valuable donation received from him at this meeting.

May 14th.

Mr. LEA, President, in the Chair.

Twenty-eight members present.

The number of the Proceedings of the Academy for April was laid on the table.

\* This name is proposed for the typical species of *Chaetodon*, or such as *Chaetodon capistratus* of Linnæus. The name of *Chaetodon* cannot be retained for the present genus, as Artedi, who first characterized it in his "*Genera Piscium*," referred to it only four species, none of which belong to this genus. The first and fourth are *Pomacanthi*. The name of *Chaetodon* may consequently be substituted for *Pomacanthus*.

† *Chaetodon gracilis* Günther Catalogue of the Acanthopterygian Fishes, vol. ii. p. 20. *Chaetodon sedentarius* Poey Memorias sobre la Historia Natural de la Isla de Cuba, tom. ii. p. 203.

A specimen from St. Croix obtained by Dr. Griffith is in the Museum of the Academy.

May 21st.

Vice President BRIDGES, in the Chair.

Thirty-four members present.

Papers were presented for publication, entitled :

“ Descriptions of Forty-nine New Species of the Genus *Malania*,” by Isaac Lea.

“ Synopsis of the Uranoscopoids,” by Theo. Gill.

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May 28th.

Mr. LEA, President, in the Chair.

Twenty-eight members present.

On report of the respective committees, the following papers were ordered to be published in the Proceedings :

On the HAPLOIDONOTINÆ.

BY THEODORE GILL.

There are found in the larger fresh water rivers and lakes of North America, west of the Rocky Mountains, and in the sea and inlets along its eastern and gulf coast, fishes which have the closest external resemblance to the typical Sciaenoids, and especially to the *Corvina*. Yet those fishes whose external characters are scarcely sufficient to even justify generic separation from the *Corvina* are distinguished by a structure of the lower pharyngeal bones, which is entirely different from that exhibited by the corresponding bones of the Sciaeninae. The difference existing between them is of such character that the learned Johannes Müller considered himself justified in assigning to them an ordinal value, and his views have been since adopted by almost all of the most learned ichthyologists. In the Sciaeninae, the lower pharyngeal bones are always and as decidedly distinct from each other as in any of the Acanthopteri of Müller. In the fishes now under discussion, the corresponding bones of the adult are firmly and immovably united in the same manner as those of the Pharyngognathi. The study of them is therefore of the greatest interest and importance, for we have thus the simple question of the value of the comparative characters of one part of the organization, relieved of all secondary considerations, to decide upon. There are no other differences of structure to accompany this one supposed fundamental character.

There had been previously known many forms, which had respectively the acanthopteran and pharyngognathan pharyngeal bones, which mutually resemble each other. Such are the Centrarchinae and the Chromoids. The members of these two groups have a very strong resemblance to each other. This is equally exhibited in form, in the armature of the fins, in color and in habits. But it is found that while the first fishes have always teeth, at least on the vomer, six branchiostegal rays and an entire lateral line, the Chromoids have the palatine arch entirely edentulous, only five branchiostegal rays, and the lateral line always interrupted; it may perhaps be also added that the fishes of the last family have the intermaxillary bones with longer ascending processes, and consequently capable of greater protrusion than those of the

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first. It may consequently be argued that the resemblance is one of analogy rather than of actual affinity, but with the fishes now under consideration, such can scarcely be argued. It can not be truly said that the real affinities are veiled under analogical resemblances, where all of the organization save one part is similar. For with the exception of the pharyngeal bones, there is no difference of at most more than generic importance between some of the genera of Sciæninæ and those of Haplodonotinæ. The form is similar; the characteristic peculiarities of the skeleton, the intestinal canal and the rest of the viscera, the squamation, the structure of the fins, the peculiar incisions of the margin of the snout between the preorbital bones, the pores of the lower jaw, the number of branchiostegal rays, the dentition, and all other features, are reproduced in the respective genera. Such being the case, we cannot hesitate to believe that the likeness between the Haplodonotinæ and the Sciæninæ is truly indicative of affinity, and we are then naturally led to the conclusion that Müller's Pharyngognathi are not entitled to ordinal distinction, although admitting that the *Acanthopteran Pharyngognathi*, known to that illustrious biologist, are natural associates.

The subfamily of Haplodonotinæ, so far as is yet known, is entirely confined to North America. Only two genera are known, one characterized by the presence of small filaments beneath the chin and lower jaw, is represented by two species found along the Atlantic coast of North America. They are the *Pogonias fasciatus* Lac., and *Pogonias chromis* Cuv. The second has no filaments, and its species are fluviatile and lacustrine; the name of *Aplodinotus* was first conferred on it by Rafinesque.

As the name of *Aplodinotus*, or according to its etymology, *Haplodonotus*, is here for the first time restored, it seems advisable to review the reasons which have induced us to adopt this in face of the assertion made by Rafinesque in the *Ichthyologia Ohiensis*. Rafinesque has there\* characterized a genus which he has called *Amblodon*, and has remarked that it was called by him "*Aplodinotus* G. 8, of my Memoir on 70 New Genera of American animals, in the *Journal History of Paris*, having been led into error, in supposing that the remarkable teeth of its throat belonged to the Buffalo-fish, as will be seen below." Under the specific description, he gives† a very good account of the pharyngeal dentition, and adds that "these teeth and their bones are common in many museums, where they are erroneously called teeth of the Buffalo-fish, or of a cat-fish. I was deceived so far by this mistake, and by the repeated assertions of several persons, as to ascribe those teeth to the Buffalo-fish, which I have since found to be a real *catostomus*; this error I now correct with pleasure."

Rafinesque, with accustomed carelessness, has reversed the proposition. It was under the name of *Amblodon* that he formerly described the lower pharyngeal bones of the Sciænid, assigning them to two *catostomoids*. Under the name of *Aplodinotus*, he indicated as correctly as was customary with him the external features of the genus of Sciænoids. As the *Journal* in which his descriptions were published, is almost inaccessible in America, the following abstract is offered, the series being in the Library of the Smithsonian Institution:

8. *Aplodinotus* (Thoracique). Corps oblong comprimé. Tête et opercules écailleux, préopercules dentelés, second opercule membraneux inerme, membranes branchiales à 6 rayons. Lèvres extensibles à petites dents en râpe. Deux nageoires dorsales confluentes, la première a rayons épineux, la seconde sans rayons épineux, écaillense longitudinalement à sa base. Nageoires

\**Ichthyologia Ohiensis*, p. 24.

†*Ichthyologia Ohiensis*, p. 25.

thoraciques sans appendices, à 7 rayons dont 1 épineux, anus postérieur. Le type de ce genre est un beau et excellent poisson de l'Ohio, *A. grunniens*, qui pèse quelque fois jusqu' à 30 liv., et que l'on y nomme *Ohio Perch*, ou *Grunting Perch* (Perche grognante,) parce qu'il produit souvent un grognement particulier. Entièrement argenté, a reniflets dorés, ligne laterale courbe posterieurement, queue lunulee, 1 rayon dorsal et anal extrêmement court, 2 rayons des

thoraciques mucronés. D. 9, 35. A.—. P. 18. C. 20. Ce genre est voisin du genre *Sciæna*, les opercules et nageoires écailleux l'en distinguent.

16. *Amblodon* (Abdominal). Différent du genre *Catostomus*. Machoire inférieure pavée de dents osseuses serrées, arrondies, à couronne plate, inégales. Les poissons de ce genre, qui abondent dans l'Ohio, le Missouri et le Mississipi, sont distingués par le nom vulgaire de *Buffalo-fish* (Poisson buffle,) et les François de la Louisiane les nomment *Piconeau*. Il y en plusieurs espèces qui parviennent souvent à une tres grosse taille. Les deux suivans habitent dans l'Ohio. 1. *A. bubalus*, Brunchiâtre, pale dessous, Joues blanchâtres, D. 28, A. 12, P. 16, A. 19, C. 24. L' *A. niger* est entièrement noir; tous deux ont la ligne latérale droite, queue bilobée, tête tronquée, etc. Ils sont tres-bons à manger.

After a perusal of the above descriptions, there can be no doubt that if they alone are consulted, the name of *Aplodinotus* must be retained. But it is with much reluctance that that name is adopted, and only in obedience to the inexorable law of priority. The name of *Amblodon* is most appropriate and correctly formed, while *Aplodinotus* is both vague and erroneously compounded. It is not quite certain how the name is derived. Agassiz, in his "Nomina Systematica Generum Piscium" derives it from *ἀπλός* simple, and *νωτός* back; a far more probable derivation is from *ἄπλοος*, *ἰδος*, a simple cloak to fit the body, and *νωτός*, the back, in allusion to the scaly coating of the base of the second dorsal fin, which Rafinesque considered as the character which chiefly distinguished the genus from *Sciæna*. Had he derived it as Agassiz suggests, he would have undoubtedly written *Aplonotus*. Accepting the above as the true etymology, the orthography of *Haploidonotus* is adopted as more correct.

It is advisable to state that there are three errors in Rafinesque's short diagnosis of "*Aplodinotus*" which need to be corrected. There are seven instead of six branchiostegal rays; there is a spine in front of the second dorsal fin, as was afterwards mentioned in the description of *Amblodon* in the *Ichthyologia Ohiensis*; there is the normal number of ventral rays, and not one spine, and six soft rays. The last error is almost excusable in such an observer as Rafinesque, for the external branch of the first ray is much developed, and resembles somewhat the large simple ray of a pectoral or caudal fin.

Adopting the name of *Haploidonotus* for the genus, it is taken as the type of the subfamily, whose characters, as well as those of its two genera, are now given.

#### Subfamily HAPLOIDONOTINÆ Gill.

The body is oblong and suboval, highest at the front of the spinous dorsal fin; the ante-dorsal region convex.

The head is oblong, with the occipito-nasal profile very oblique, and the snout high and more or less convex. The upper jaw is longer than the lower. The supramaxillary bones are mostly retractile under the suborbitals, and cease before the vertical of the end of the orbit. The margin of the snout between the preorbital bones has four small oblique incisions. There are five pores beneath the chin.

The first dorsal fin is longer than high, and commences nearly over the bases of the pectorals; it is connected with the second by a very low membrane.


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The anal fin is trapezoidal, higher than long, and under or behind the median rays of the second dorsal.

The pectoral fins are pointed. The ventral are inserted almost beneath the bases of the pectoral.

The scales on the body and crown have pectiniform borders; those on the cheeks and opercula are mostly cycloid.

The lateral line is continued to the end of the caudal fin.

The inferior pharyngeal bones are triangular, with their basal or posterior margin widest, and provided with a shallow, braced-formed () emargination, the posterior processes being short and robust. There is a much thickened triangular area beneath and behind, the apex of which is continued into a median or sutural carina or elevation, whence the bones decrease in thickness to the margin. From the base of each ascending side of the thickened triangular area, a strong compressed process proceeds downwards and outwards, and is nearly at a right angle to an inferior ridge, which terminates at the end of the compressed posterior process of the bone.

There are three upper pharyngeal bones on each side; the median is broad and of a curvilinear, triangular or subcircular form; the anterior and posterior narrow.

Most of the teeth of the inferior and upper pharyngeal bones of the adult are molar, short, and with truncated or slightly excavated crowns. Only those of the external margins are sometimes cylindro-conic.

The setæ laminae of the ceratohyals of the first pair of branchial arches are very short and compressed; their internal margins are provided with small acute teeth. The dentiferous lamellæ of the remaining branchial arches are small and ridge-like, distant and armed with small recurved acute teeth.

Pseudobranchiæ are present.

The pharyngeal bones of the young are separated, but in the adult they become immovably united, like those of the Pharyngognathi of Müller. The teeth of the young also incline toward an obtusely cylindro-conic form, but with advancing age, they become more and more robust and truncated, and in the old, almost the entire surfaces of the lower and median upper pharyngeals are paved with short truncated molars. The teeth of the external margins of the median upper pharyngeals generally retain the form which the teeth of the young possessed.

#### Genus *HAPLODONOTUS* (Raf.)

*Aplodinotus Raf.*, Journal de Physique, de Chemie, et d'Histoire Naturelle, vol. lxxxviii. p. 418. June, 1819.

*Amblodon Raf.*, Journal de Physique, de Chemie, et d'Histoire Naturelle, vol. lxxxviii. p. 421. June, 1819.

Lower pharyngeal bones described and erroneously attributed to *Catostomoids*:

*Amblodon Raf.*, Ichthyologia Ohiensis, p. 24.

*Corvina sp.*, Cuvier, Richardson, Kirtland, DeKay, Storer, Günther, etc.

*Amblodon Agassiz*, American Journal of Science and Art, ser. ii. vol. xvii. p. 307.

“ sp. *Girard*, Report of Explorations and Surveys for Pacific Railroad route, vol. x. *Fishes*, p. 95.

Body rather elongated or oblong; the subdorsal outline declines backwards with scarcely a curve.

Head oblong; dorso-nasal profile declining with a slight sigmoidal curve; snout high and truncated. Eyes mostly anterior. Preoperculum minutely crenulated. Chin covered with simple skin.

Teeth on a villiform band in each jaw; that of the upper preceded by a row of slightly larger ones.

1861.]

Anterior dorsal fin with nine or ten spines. Anal with two spines, the second of which is large. Caudal lanceolated.

The pharyngeal bones as well as the armature of the branchial arches have been described as characteristic of the subfamily. There is no essential difference between those of the two genera of the group.

Type *Haploidonotus grunniens* (Raf.)

*Syn.* *Aplodinotus grunniens* Raf., Journal de Physique, vol. lxxxviii.

*Ambledon grunniens* Raf.

*Sciæna oscula* Les.

*Sciæna grisea* Les.

*Corvina oscula* Cuv. et Val.

*Corvina grisea* DeKay.

#### Genus *POGONIAS* Lacépède.

*Labrus* sp. Linn.

*Pogonias Lacépède*, Hist. Nat., vol. iii. p. 137.

*Pogonathe* sp. Lacépède, Hist. Nat., vol. v. p. 121.

*Sciæna* sp. Lacépède, Mitchell.

*Labrus* sp. Mitchell.

*Pogonias Cuvier*, Regne Animal, ed. i. vol. ii. p. 298.

*Pogonathus* Bon.

Body oblong; subdorsal outline little decurved backwards.

Head oblong; dorso-nasal profile nearly regularly curved, or the sigmoidal flexure obsolete. Snout high. Eyes anterior. Preoperculum entire. Chin furnished with many filaments, and each ramus of the lower furnished internally for most of its length with a row of distant ones.

Teeth in a villiform band in each jaw.

Anterior dorsal fin with ten spines. Anal with two; the second large and stout. Caudal subtruncated.

This genus is very closely related to *Haploidonotus*, the only essential differential characters being the beard filaments of the chin and lower jaw, and perhaps the form of the caudal fin.

Type *Pogonias fasciatus* Lacépède.

An additional representative of the subfamily of *Haploidonotinae* may perhaps be found in the *Chilotrema fasciatum* of Tschudi.\* That species has a greater superficial resemblance to the *Pogonias fasciatus* than any other fish, but bearing in mind the close resemblance of *Haploidonotus* to *Corvina*, we do not even dare to positively assert that it belongs to the same subfamily.

The following list will exhibit the number of species of the subfamily of *Haploidonotinae* of the United States. As has been already remarked, the genus *Pogonias*, containing bearded species, with truncated caudal fins, are marine, and found on the Atlantic coast, while the *Haploidonoti*, without beards, and with lanceolated caudal fins, are found only in the larger fresh water rivers and lakes.

#### Genus *HAPLOIDONOTUS* (Raf.)

*Haploidonotus grunniens* Raf.

*Aplodinotus grunniens* Raf., Journal de Physique, &c., vol. lxxxviii, p. 418.

*Haploidonotus concinnus* Gill.

*Ambledon concinnus* Agassiz, American Journal of Science and Art, ser. ii. vol. xvii. p. 307.

\* *Tschudi* Fauna Peruana. Ichthyologia, p. 13, tab. 1.

*Haploidonotus lineatus Gill.*

*Ambledon lineatus Agassiz*, American Journal of Science and Art, ser. ii. vol. xvii. p. 307.

*Haploidonotus neglectus Gill.*

*Ambledon neglectus Girard*, United States and Mexican Boundary Survey. *Ichthyology*, p. 12, pl. v. figs 6-10.

*Haploidonotus Richardsonii Gill.*

*Corvina Richardsonii Cuv. et Val.*, Hist. Nat. des Poissons, vol. v. p. 100.

The last species will be found to be the representative of a distinct genus, but with our present knowledge, it is unadvisable to characterize it. Cuvier and Valenciennes, in the *Histoire Naturelle des Poissons*, as well as Richardson in the *Fauna Boreali-Americana*, have attributed to it seven branchiostegal rays. In the article "Ichthyology," of the last edition of the *Encyclopædia Britannica*, (p. 284,) Sir John Richardson has remarked of the species as follows: "We have, however, some suspicion of its belonging more properly to the Theraponidæ than to the Scænidæ, notwithstanding Cuvier's weighty authority. It has only six branchiostegals." The former description is probably correct. The species certainly is not allied to the Theraponidæ. It differs principally from the true *Haploidonoti* by the form of its head, and of the caudal fin.

The *Ambledon saturnus* of Girard belongs to the subfamily of Scæninæ, and to the genus *Rhinoscion* Gill.

Of the marine genus, there are two species.

## Genus POGONIAS Lac.

*Pogonias fasciatus Lac.*

*Pogonias chromis Cuv.*

## On the Genus ANISOTREMUS Gill.

BY THEODORE GILL.

In the "Catalogue of the Fishes of the Eastern Coast of North America," the *Pristipoma rodo* of Cuvier, which is a doubtful or accidental visitor to the southern coast of the United States, has been taken as the type of a distinct genus on which the name of *Anisotremus* has been conferred. The characters of the genus are now given, with descriptions of the type and a newly discovered species from the western coast of Central America.

## ANISOTREMUS Gill.

*Anisotremus Gill*, Catalogue of the Fishes of the Eastern Coast of North America, p. 32.

*Sparus* sp. *Linn.* et al.

*Perca* sp. *Bloch.*

*Grammistes* sp. *Bloch, Schneid.*

*Lutjanus* sp. *Lacépède.*

*Pristipoma* sp. *Cuv., auct.*

Body rhombo-ovate and much compressed, highest at the anterior part of the first dorsal fin, and thence declining toward the end of the second, gradually under the first, more rapidly under the second. Ante-dorsal region very convex, and profile thence declining very rapidly to the snout.

Head laterally of a rhomboid form, higher than long, with the profile very oblique and nearly parallel with the obliquely descending border of the operculum. Preoperculum behind nearly vertical and finely serrated. Two pores in front of the lower jaw, and a central groove behind.

1861.]

Mouth small and terminal. Supramaxillars and ends of maxillars entirely exposed, and invested in very thick attached lips. Lower jaw also with very thick lateral lips separated by a wide isthmus.

Teeth villiform in each jaw, with a somewhat larger external row.

Anterior dorsal behind lower than the second, generally with twelve spines, the third, fourth and fifth of which are longest. Anal fin with three spines, the second of which is very large and compressed. Caudal deeply notched. Pectoral fins acuminate.

Branchiostegal membrane thick and with the emargination below, not extending much before the angle of the preoperculum; six branchiostegal rays.

The lower pharyngeals when united present above a U-shaped outline, with the limbs slowly diverging. Behind and between the posterior processes is a transverse emargination of a semi-elliptical form. Beneath, there is a V-shaped ridge, whose limbs terminate in the compressed posterior processes of the bones. The bones are thickest at and behind the posterior third, where the limbs of the V-shaped ridge are also swollen. The bones are in close contact to each other.

The upper pharyngeals are triple on each side; the median is triangular, with its angles rounded.

The teeth of the lower pharyngeals have mostly hemispherical summits. The lateral marginal ones are cylindro-conical, and those at the bases of the posterior processes are elongate-conic.

The teeth of the median upper pharyngeals are also mostly molar, those of the lateral margins and those of the anterior and posterior bones are cylindro-conic.

The setæ of the cerato-branchials of the first pair of branchial arches are short, compressed, tapering and almost smooth. The inner side of the first, and both sides of the second and third branchial arches with alternating larger and smaller vertical ridges, which are longitudinally grooved below; they are mostly unarmed, but the larger have sometimes one or two teeth at their extremities. The branchial arches of the fourth pair have many little separated dentiferous tubercles on their concave margin; the teeth are chiefly cylindro-conic.

The genus now characterized differs from *Pristipoma*,\* of which the *Pristipoma hasta* of Cuvier or *Lutjanus hasta* of Bloch is the type, by its form, smaller mouth, thick lips and pharyngeal bones; the height is much greater and the profile much more oblique; the facies is consequently quite dissimilar to that of the *Pristipoma hasta*.

#### ANISOTREMUS VIRGINICUS Gill.

Guatucupa Juba *Maregrave*, Historia Naturalis Brasiliæ, p. 147. 1648.

Acara pinima *Maregrave*, loc. cit., p. 152.

Sparus virginicus *Linn.* Systema Naturæ, ed. x. (Holmiæ,) vol. i. p. 281. 1758.

Sparus vittatus *Bloch*, Naturgeschichte der Ausländischen Fische.

Perca juba *Bloch*, op. cit. tom.

Le Rhomboidal *Daubenton and Haüy*, Encyclopedie Methodique, tom. iii. pp. 333, 376.

Le Rhomboidal (S. Virginicus) *Bonnaterre*, Tableau Encyclopedique et Methodique, *Ichthyologic*, p. 103.

Sparus virginicus *Linn.*, Systema Naturæ, *Gmelin* ed., p. 1278.

Sparus vittatus *Artedi*, Genera Piscium, *Walbaum* ed., p. 290.

Sparus virginicus *Artedi*, Genera Piscium, *Walbaum* ed., p. 297.

Sparus Jub. *Lacépède*, Hist. Nat. des Poissons, tom. iv. pp. 43, 138.

Lutjanus virginicus *Lacépède*, op. cit., tom. iv. pp. 197, 199.

\**Pristipoma Cuv.* Regne Animal, ed. i. vol. ii. p. 279.

- Grammistes Juba Bloch, Systema Ichthyologiæ, Schneid. ed. p. 184.  
 Grammistes mauritii Bloch, Systema Ichthyologiæ, Schneid. ed. p. 185.  
 Sparus virginicus Bloch, Systema Ichthyologiæ, Schneid. ed. p. 274.  
 Juba Sparus Shaw, General Zoology, vol. iv. p. 431, 1803.  
 Virginian Sparus Shaw, op. cit. vol. iv. p. 436.  
 Vittated Sparus Shaw, op. cit. vol. iv. p. 465.  
 Pristipoma rodo Cuv. et Val., Hist. Nat. des Poissons, tom v. p. 274. Storer,  
 Synopsis of the Fishes of North America, p. 76; *ib.* in Memoirs of the  
 American Academy of Arts and Sciences, vol. ii. p. 328. Guichenot, in  
 Ramon de la Sagra's Histoire de Cuba, Poissons, p. 70.  
 Pristipoma virginicum Günther, Catalogue of the Acanthopterygian Fishes,  
 &c., p. 288.  
 Anisotremus virginicus Gill, Catalogue of the Fishes of the Eastern Coast  
 of North America, p. 32.

The number and character of the rays is expressed in the following formula :

$$\begin{array}{ccccccc}
 & 1 & & 1 & & & 1 \\
 \text{D. XII. } 14\text{---} & \text{to } 16\text{---} & \text{A. III. } 9\text{---} & \text{C. } 4, 1, 8, 7, 1, 3. & \text{P. } 2, 14. & \text{V. I. } 5. \\
 & 1 & & 1 & & & 1
 \end{array}$$

The body is of a steel blue color, which merges into a silvery gray on the abdomen. There are darker spots on the central portions of the scales of the dorsal region, which have a tendency to form *oblique purplish lines running behind and upwards*. There are two vertical bands, the anterior of which is oblique, and runs from the nape to the corner of the mouth, but interrupted at the eye. The second is vertical and proceeds from the front of the dorsal fin to the base of the pectoral. Behind the latter bands, there are about *seven broad longitudinal bands of a light yellow color, most of which are double or branched anteriorly*. The sixth and seventh bands are not usually divided in front. The upper branch of the third band is sometimes again subdivided. The first band terminates under the first five soft-branched rays of the dorsal fin; the second under first part of the second half of the articulated portion of the dorsal; *the third extends on the upper ridge of the caudal peduncle and unites with that of the opposite side behind the dorsal; the fourth runs on the sides of the tail along the scales of the lateral line; the fifth runs behind above the inferior ridge of the caudal peduncle; the sixth ends at the terminal portion of the anal fin; the seventh is very indistinct*. The fins are yellowish; the ventral tinged with purplish.

This species was first very well described by Linnæus, under the name of *Sparus virginicus*, and the specific portion of his name has been consequently retained. If, however, it should not be hereafter discovered on any part of the coast of the ancient colony of Virginia, it will be requisite to change the name, and as Bloch's name of *Sparus vittatus* is next in order of time, that may be adopted, notwithstanding his defective figure and description. They are no worse than those of many other species for which his names have been retained. It will therefore be named *Anisotremus vittatus*.

Under the name of *Pristipoma virginicum*, Dr. Günther has published a description which is inapplicable to this species. He mentions the presence behind the vertical dorso-pectoral band of only "six parallel bluish longitudinal bands." Such a description would be rather more applicable to the *Anisotremus tenuatus* of Panama here described, were the bands margined with purplish. But Dr. Günther has probably had specimens in which the ground color and yellow bands had faded and become merged below, and has mistaken the ground color on the dorsal and lateral regions for bands.

ANISOTREMUS TENIATUS Gill.

The radial formula is as follows :

$$\begin{array}{ccccccc}
 & 1 & & 1 & & & \\
 \text{D. XII. } 16\text{---} & \text{A. III. } 9\text{---} & \text{C. } 4, 1, 8, 7, 1, 3. & \text{P. } 2, 16. & \text{V. I. } 5 \\
 & 1 & & 1 & & & 
 \end{array}$$

The first spine of the anal fin is shaped like a compressed pen.

The body is of a buff or fawn color, inclining to silvery beneath, and with golden lines running along the median line of the scales; those of the dorsal region run obliquely backwards and upwards. There are two vertical bands, one of which is oblique, and passes from the nape to the angle of the mouth, but interrupted by the eye; the second is vertical, and extends from the commencement of the dorsal fin to the base of the pectoral. There are also behind on each side seven longitudinal and nearly parallel silver simple narrow bands bordered on each edge with purplish; the first is immediately under the spinous part of the dorsal from the first to the tenth spinous rays; the second commences on the fifth row of scales from the back, and ends under the fifth branched ray; the third on the eighth, and extends nearly to the end of the dorsal; the fourth at the horizon of the superior border of the orbit, and terminates at the base of the caudal, between the lateral line and upper surface of caudal peduncle; the fifth runs from above the axilla of pectoral to the base of caudal, and near its end immediately under the lateral line; the sixth from the inferior axilla of pectoral to the end of anal; the seventh is very indistinct or obsolete. The fins are yellowish; the ventral tinged with purplish.

The species above described is very nearly allied to the *Anisotremus virginicus*. It inhabits the western coast of tropical America, and has been noticed under the name of *Pristipoma rodo*, in the Proceedings of the Academy of Natural Sciences, as being one of the few marine animals that are found on both sides of the continent. Although certainly very nearly allied to the species of the eastern waters it appears to be quite distinct. As will be seen by the comparative descriptions of the two species here offered, the color amply distinguishes them. In the species of the Caribbean Sea and neighboring waters, there are in front from ten to fourteen longitudinal yellow bands, most of which unite by pairs at a greater or less distance behind, and are reduced to seven. In the *Anisotremus tenuatus*, there are only seven narrow silvery bands bordered with purplish. The bands of the respective species are also quite differently situated. In the *Anisotremus virginicus*, there are only indistinct oblique purplish lines running along the centres of each row of scales. In the *Anisotremus tenuatus* the lines are of a golden color, and are present on the sides as well as the dorsal region.

One specimen of this species is preserved in the Museum of the Academy of Natural Sciences. It was obtained by Dr. Ruschenberger at Panama.

NOTE.—In the advance sheets of a "Conspectus Piscium Cubensium," recently published by my learned friend and correspondent, M. Poey, the Professor of Comparative Anatomy and Zoology in the Royal University of Havana, the species formerly described by that gentleman, as *Pristipoma splenatum* and *P. trilineatum*, are referred to this genus, and called *Anisotremus splenatum* and *A. trilineatum*. The former species is very closely allied to the *Pristipoma bilineatum* of Cuvier. I have some doubt whether those species are really congeneric with the *A. virginicus*, and having never seen them, did not dare to positively refer them to it; they are at least very closely related to them, and may possibly be generically allied.

### Synopsis of the URANOSCOPOIDS.

BY THEODORE GILL.

There lives in the Mediterranean Sea a fish which has been long known and celebrated for its peculiar form. Its head is cubical; its eyes situated on the superior surface, so to only enable it to look above, its pupil being equally so directed and not towards the sides, as are those of the Rays\*. This fish has

\* Cuv. et Val Hist. Nat. des Poissons, tome iii. p. 288.



received from the ancient Greeks the various names of *Ὀυρανοσκόπος*, *Ἄγυς* and *Καλλιόνημις*; when it was classified in the system by Linnæus, the name of *Uranoscopus* was accepted for its generic appellation, and has been retained by all succeeding naturalists. Many species have been since referred to the genus, which, although possessed of a similar form, differ considerably in the details of structure. The peculiarity of form is therefore not a generic character, but indicative of much higher importance; it is also coincident with many other well marked characteristics, some of which are of much importance, and the combination of which without much doubt indicates that the group is of family value.\*

All the species with the form of the ancient *Uranoscopus* discovered until within most recent times, had not only the same general and essential, but almost the same positive form as to its details. They chiefly differed in the comparative degree of armature of the head, the presence or absence of scales, the character of the dorsal fin, and the presence or absence of intralabial filaments and mental barbels. The differences were evidently of no more than generic value.

But comparatively, recently, there has been referred to the genus *Uranoscopus* a fish† which does indeed possess the same general form as the typical species, but differs very materially in the greater elongation of its body, as well as in several other essential characters, which the study of the family convinces us are of much more than generic value. It represents, then, not only a distinct natural genus, but a distinct subfamily; the latter has been recently named *Leptoscopinæ*; the genus *Leptoscopus*.‡

Still more recently, there has been referred to the family of Uranoscopoids, a remarkable fish§ first discovered at the West Indian island of Barbados, which preserves the same general form as *Uranoscopus* and the same specialized form as *Leptoscopus*. Yet this fish is characterized by a feature which may be almost termed anomalous with respect to this family. It has only three ventral rays! those rays are also simply articulated, and not branched, thus resembling those of the Blennoids. And yet nature, as if to instruct us as to the little value of any single character which is not a modification of a most important organ, has imprinted on this fish, as has been already remarked, not only the same general but absolutely all the details of form exhibited by *Leptoscopus*. The only other external generic characteristic which distinguish the West Indian fish from the *Leptoscopus* are the approximation or separation of the ventral fins,|| and the relative position of the dorsal and anal. In both of these respects, the *Leptoscopi* approach nearer to the *Uranoscopinæ* than the *Leptoscopinæ*. The dorsal and anal fins are much elongated in both of those genera, in contradistinction to those of the *Uranoscopinæ*; but the relative elongation is reversed in the two. In *Leptoscopus* the commencement of the dorsal is posterior to the vertical of that of the anal, while in *Dactyloscopus* it is anterior. There are also palatine teeth in *Leptoscopus*, as in all of the known *Uranoscopinæ*, whilst in the *Dactyloscopi*, they are absent. But as if to render the close affinity of the *Leptoscopi* and the *Dactyloscopi* still more evident, there has been recently discovered, at the Island of New Zealand, a fish¶ whose almost sole difference from *Leptoscopus* is also the

\* The Uranoscopoids would form one of the strongest arguments in favor of the Agassizian doctrine of the value of form as a family character. That form which results from the similar relations, combinations and proportions of the most important parts, external as well as internal, appears in most cases to be characteristic of natural families.

† *Uranoscopus macropygus* Richardson.

‡ *Leptoscopus* Gill, Günther.

§ *Dactyloscopus* Gill, Poey.

|| In this respect the *Dactyloscopi* resemble the typical Uranoscopoids more than do the *Leptoscopi*.

¶ *Crapatalus* Günther.

absence of palatine teeth. When the perfect concordance of *Leptoscopus* and *Dactyloscopus* in so many and so most characteristic features is then recalled, can the demonstration of the pertinence of the two genera to the same natural family be rendered more evident? Yet this peculiar modification of the ventral fins is most remarkable in a member of this family; it is certainly one that the naturalist would not *a priori* expect to be found. Dr. Günther, doubtless influenced by such considerations, has not noticed the *Dactyloscopi* in his catalogue of Acanthopterygian Fishes, as a member of his group of Uranoscopina. Having never seen it, he probably, notwithstanding the comparisons and observations recorded in the original description, considered it to be a Blennoid; the only character that it possesses in common with that family is the structure of the ventral fins. We again repeat, that not only the preponderance but the totality of its characters, with that sole exception, decides that its legitimate affinities are to the *Leptoscopi*. But to vindicate our appreciation of the importance of this character in the present family, we have proposed to institute for the genus a distinct subfamily.

Nor is the peculiar modification of the ventral fins the only character which is generally indicative of family rank, but here of much less value. The Uranoscopinae have a coecal stomach and a moderate number of pyloric coeca, the number in the species examined ranging from eight to twelve, but in *Leptoscopus* the coeca are entirely absent. This is undoubtedly a characteristic of as much importance as the peculiarity of the ventral fins. Yet Dr. Günther has with propriety retained the species as characterized among his Uranoscopina, a group which is equivalent to the family of Uranoscopoids as here admitted after the subtraction of the *Dactyloscopi*.

It will be observed that I have always compared the *Dactyloscopi* to the *Leptoscopi*, and asserted that both belong to the same family. If ever a division of the Uranoscopoids should be made, or if any forms now referred to it are abstracted, they would properly be the Leptoscopinae and Dactyloscopinae together. Those groups resemble each other in their elongated body covered with moderate scales, their median lateral line, the long dorsal and anal fins, and the smooth head. In all of these respects they differ from the Uranoscopinae. The latter have also pancreatic coeca, while doubtless all the former have none. The Leptoscopinae and Dactyloscopinae will, therefore, be probably referred by some future naturalist to a distinct family, but I am not myself prepared at present to adopt such, and entertain some doubt whether such a separation would be ever justifiable. In my former remarks on *Dactyloscopus* I have observed that "had either the peculiarity of dentition or of the ventral fins singly distinguished the *Dactyloscopi* from the *Leptoscopi*, both might possibly have been naturally placed in the same tribe or subfamily." I have further remarked, that "notwithstanding the abnormal and blennoid structure of the ventrals, and the absence of the vomerine and palatine teeth, the *Dactyloscopinae* appear to be almost as much related to the *Leptoscopinae* as the latter are to the *Uranoscopinae*, properly so called." Since the not unexpected discovery of *Crapatalus*, I will now express my belief in the much greater affinity between the *Dactyloscopinae* and *Leptoscopinae* than that of the latter to the *Uranoscopinae*. The subfamilies are now indeed distinguished by almost only one character, but I still retain them.

From the preceding observations, it is apparent that there are few groups of such intrinsic interest, as well as of such importance for the proper information of the value of certain characters. We are taught not to place too great reliance on any one character, as such might cause us to violate the principle of natural classification. The close identity of general form, so characteristic of the entire family, and the combination of characters so numerous and so peculiar, forbid the naturalist from the consideration of any one of the groups referred to as the representative of different or distinct families, notwithstanding the absence of pyloric coeca in one, and the additional modification of the

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ventral fins of the others. How numerous are those peculiar features which are possessed by all the members of this family will be evident from the diagnosis which is now offered.

URANOSCOPOIDÆ Gill.

The body is more or less elongated, conical or subcylindrical, widest and generally highest at the preopercular region; thence the dorsal and abdominal outlines regularly converge. The scales are very minute, or of moderate size, and sometimes absent.

The head is cuboid, little narrower, and nearly vertical in front; the eyes rather small, anterior and superior; the median infraorbital bones not connected with the preopercular. The nostrils are double. The mouth is vertical, the lips fringed. The intermaxillary bones have very short posterior processes, and are in front of the maxillary, except at the ends of the latter.

The branchial apertures are very large, and extend before the pelvic bones. The branchiostegal membrane is doubled in front, and forms a transverse flap between the dentary and angular bones, which conceals anteriorly the branchiostegals. There are six rays.

The branchiæ are biserial on the four branchial arches, and there are also pseudo-branchiæ.

The dorsal and anal fins are nearly equal in size, and are always elongated; the anus is consequently anterior. The caudal is subtruncated. The pectorals have oblique bases, and their rays rapidly decrease in length beneath. The ventrals are jugular.

Head more or less mailed above. Body moderately elongated, URANOSCOPINÆ.

Two dorsal fis.s.

Body scaly. Head mailed above. An intralabial filament.

Preopercular spines below, . . . . . 1. Uranoscopus.

Preopercular spines below. Chin with barbel, . . . . . 2. Nematagnus.

Body scaly. Head with a transverse posterior plate, whence proceeds a Y-shaped apophysis, . . . . . 3. Upselonphorus.

Body naked. Head mailed above, . . . . . 4. Astroscopus.

Dorsal fin single.

Body scaly. Head mailed above.

Dorsal with 3—4 spines, . . . . . 5. Ichthyoscopus.

Dorsal unarmed. Lower jaw entire, . . . . . 6. Genyagnus.

Dorsal unarmed. Lower jaw enlarged beneath, . . . . . 7. Gnathagnus.

Body naked, . . . . . 8. Cathetostoma.

Head covered with naked skin. Body elongated.

Ventral rays I. 5, . . . . . LEPTOSCOPINÆ.

Vomerine and palatine teeth present, . . . . . 9. Leptoscopus.

Vomerine and palatine teeth none, . . . . . 10. Crapatalus.

Ventral rays 3, simply articulated, . . . . . DACTYLOSCOPINÆ.

Vomerine and palatine teeth absent, . . . . . 11. Dactyloscopus.

URANOSCOPINÆ (Bon.) Gill.

The body is moderately elongated, and covered with very minute scales, or naked. The lateral line runs abruptly upwards to the dorsal region, is continued under the dorsal fin to its end, and thence deflected downwards to the base of the caudal.

The head is more or less completely covered with bony plates. There are teeth on the vomerine and palatine bones.

The anus is in the second third of the total length; the anal fin moderately elongated and with less than twenty rays. The jugular ventrals are approximated, and have each a slender spine and five rapidly increasing branched rays.

## I. URANOSCOPIUS (Linn.) Gill.

Trochinus sp. *Artdi*, Genera Piscium.

Uranoscopus *Linn.*, Systema Naturæ.

Callionymus sp. *Gronovius*.

Head above completely covered with the bony armor. Preoperculum armed beneath with four to six spines. Lower jaw with its inferior margin entire and not abruptly notched; its internal membranous velum provided with a filament. Body covered with scales. Two dorsal fins; the first with three, four or five short spines. The second corresponding to the anal.

The genus *Uranoscopus* is now restricted to those species which resemble the long known *Uranoscopus scaber* in the form of body, squamation, fins, armature of the head and the presence of intralabial barbel. The other species that have been referred to it by naturalists do not appear to be congeneric, but are rather the types of several quite distinct and well marked genera. The genus as now limited still contains nine of the known species.

## 1. URANOSCOPIUS SCABER Linn.

Trachinus, sp. 2, *Artdi*, Genera Piscium, p. 42.

Uranoscopus scaber *Linn.*, Systema Naturæ, vol. i. p. 434.

Callionymus araneus *Gronov.*

*Habitat.*—Mediterranean Sea.

## 2. URANOSCOPIUS MARMORATUS Cuv. et Val.

Uranoscopus marmoratus *Cuv. et Val.*, Hist. Nat. des Poissons, tom. iii. p. 304.

*Habitat.*—East Indies.

## 3. URANOSCOPIUS AFFINIS Cuv. et Val.

Uranoscopus affinis *Cuv. et Val.*, Hist. Nat. des Poissons, tom. iii. p. 304.

*Habitat.*—Indian Ocean.

## 4. URANOSCOPIUS OCCIDENTALIS Agassiz.

Uranoscopus occidentalis *Agassiz*, Selecta Genera et Species Piscium, p. 123, pl. lxxiii.

*Habitat.*—West Indies.

## 5. URANOSCOPIUS GUTTATUS Cuv. et Val.

Uranoscopus guttatus, *Cuv. et Val.*, Hist. Nat. des Poissons, tom. iii. p. 305.

*Habitat.*—Indian Ocean.

## 6. URANOSCOPIUS BICINCTUS Temm. et Schlegel.

Uranoscopus bicinctus *Temminck et Schlegel*, Fauna Japonica, Pisces, p. 26, pl. 10 B.

*Habitat.*—Chinese and Japanese seas.

## 7. URANOSCOPIUS ASPER Temm. et Schlegel.

Uranoscopus asper *Temminck et Schlegel*, Fauna Japonica, Pisces, p. 26, pl. ix. fig. 1.

*Habitat.*—Chinese and Japanese seas.

## 8. URANOSCOPIUS SULPHUREUS Cuv. et Val.

Uranoscopus sulphureus *Cuv. et Val.*, Hist. Nat. des Poissons, tom. viii. p. 495.

*Habitat.*—Friendly Islands.

## 9. URANOSCOPIUS COGNATUS Cantor.

Uranoscopus cognatus, *Cantor*, Catalogue of Malayan Fishes, p. 21.

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## II. NEMATAGNUS Gill.

*Uranoscopus* sp. *Cuv. et Val.*

Head above covered with bony plates. Preoperculum armed beneath with about five spines or less. Lower jaw entire beneath. *Chin with a barbel.* Intralabial filament also present. Body covered with scales. Two dorsal fins, the first of which has four short spines, the second nearly coextensive with the anal.

This genus is distinguished by the presence of the mental barbel conjoined with the characteristics of the typical *Uranoscopus*.

A single species is known; it is an inhabitant of the Indian Ocean.

NEMATAGNUS FILIBARBIS Gill.

*Uranoscopus filibarbis* *Cuv. et Val.*, Hist. Nat. des Poissons, vol. iii. p. 307.

## III. UPSELONPHORUS Gill.

*Uranoscopus* sp. *Cuv. et Val.*, *Günther.*

*Astroscopus* sp. *Gill, Abbott.*

Head above with its crown only covered with a transverse plate, from the front of which a bifurcated apophysis proceeds and sends a limb to each orbit. The postocular region is consequently covered only with the skin. Cheeks naked. Preoperculum with a small angular and inferior projection, as in *Astroscopus*. Lower jaw entire beneath. No intralabial filament. Body covered with minute scales. Dorsal fins two; the first with four short spines; the second opposite the anal.

*Upselophonorus* is readily distinguished from all its relations by the skin-covered postocular regions, separated from each other by the apophysis which proceeds from the middle of the front of the transverse posterior plates. This apophysis has nearly the form of the Greek letter  $\Upsilon$ . In allusion to this characteristic feature the name has been proposed.\* The genus is also distinguished from *Uranoscopus* by the absence of an intralabial filament, and by the absence of inferior preopercular spines. The latter characteristics are found in *Astroscopus* but the head of that genus is mailed above. Two species have been discovered.

UPSELONPHORUS Y-GRÆCUM Gill.

*Uranoscopus y-græcum* *Cuv. et Val.*, Hist. Nat. des Poissons, tom. iii. p. 308.

*Astroscopus y-græcum* *Gill*, Proceedings of the Academy of Natural Sciences of Philada., 1860, p. 20.

*Uranoscopus y-græcum* *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 229.

*Habitat.*—Caribbean Sea, (Dr. Günther.)

UPSELONPHORUS GUTTATUS Gill.

*Astroscopus guttatus* *Abbott*, Proceedings of the Academy of Natural Sciences of Philada., 1860, p. 365, pl. vii. *Gill*, Catalogue of the Fishes of the Eastern Coast of North America, p. 43.

*Habitat.*—Eastern coast of North America, from New York to Georgia.

## IV. ASTROSCOPUS Brevoort.

*Uranoscopus* sp. *Cuv. et Val.*

*Astroscopus* *Gill*, Proceedings of Academy of Natural Sciences of Philada., p. 20, Jan. 1860.

*Agnus* *Günther*, Catalogue of Acanthopterygian Fishes, vol. ii. p. 229, 1860—1.

Head above nearly completely covered with bony plates. Cheeks naked. Preoperculum with two blunt processes generally radiating from the angle of its anterior limb, one of which is directed downwards and forwards. Lower

\*  $\Upsilon$  ἄλσν and φαρὰς, bearing.

jaw not notched beneath. Intralabial filament obsolete. Body naked. Two dorsal fins; the first with four short spines, the second equal to the anal.

*Astroscopeus* resembles *Upselonphorus* in the absence of an intralabial filament, the condition of the preoperculum, and the naked cheeks, but is distinguished from that genus by the complete armature of the superior surface of the head and the almost naked body.

ASTROSCOPUS ANOPLUS Brevoort.

*Uranoscopeus anoplus* *Cuv. et Val.*, Hist. Nat. des Poissons, tom. viii. p. 493. *DeKay*, Natural History of New York Fishes, p. 37, pl. xxii. fig. 65.

*Storer*, Synopsis of the Fishes of North America, p. 46; *ib.* in Memoirs of the American Academy, vol. ii. p. 298.

*Astroscopeus anoplus* *Gill*, Proceedings of the Academy of Natural Sciences of Philadelphia, 1860, p. 20.

*Agnus anoplus* *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 229.

*Astroscopeus anoplus* *Gill*, Catalogue of the Fishes of the Eastern coast of North America, p. 43.

V. CATHETOSTOMA Günther.

*Kathetostoma* *Günther*, Catalogue of Acanthopterygian Fishes, &c., vol. ii. p. 231.

*Uranoscopeus* sp. *Cuv. et Val.*

Head nearly square above, and covered with bony plates. Cheeks naked. Preoperculum armed at its inferior margin with several spines. Lower jaw not notched beneath. Intralabial filament obsolete. Body without scales. Dorsal fin single, and commencing over the second half of the pectorals fins, with no strong spines.

This genus is readily distinguished by the naked body and single short and unarmed dorsal fin. The lateral line also ascends less rapidly on the dorsal region, and runs farther from the base of the dorsal fin than in the other members of the subfamily of *Uranoscopinae*, except *Gnathagnus*.

Only one species is known.

CATHETOSTOMA LÆVE Günther.

*Uranoscopeus lævis* *Bloch*, Systema Ichthyologiæ *Schneid.* ed., p. 47, tab. viii.

*Ichthyoscopeus lævis* *Swainson*, Natural History of Fishes, Amphibians and Reptiles, vol. ii. p. 269.

*Kathetostoma læve* *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 231.

*Habitat.*—Australian seas.

VI. ICHTHYOSCOPEUS Swainson.

*Ichthyoscopeus* sp. *Swainson*, Natural History of Fishes, Amphibians and Reptiles, p. 269, 1839.

*Anema* sp. *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 230, 1859—60.

*Uranoscopeus* sp. *Cuv. et Val.*

Head above completely mailed. Cheeks naked. Preoperculum unarmed. Lower jaw entire beneath. Intralabial filament obsolete. Body covered with minute scales. Dorsal fin single and opposite the anal, but armed in front with three or four gradually increasing spines.

*Ichthyoscopeus*, as now restricted, contains only species with a scaly body, provided with a single dorsal fin, whose first rays are spinous. There are neither intralabial filaments nor mental barbels.

ICHTHYOSCOPEUS LE BECKII Gill.

*Uranoscopeus* *Le Beck* *Bloch*, Systema Ichthyologiæ, *Schneid.* ed., p. 47.

*Uranoscopeus inermis* *Cuv. et Val.*, Hist. Nat. des Poissons, tom. iii. p. 310, pl. 65.

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*Ichthyoscopus inermis* Swainson, Nat. Hist. of Fishes, Amphibians and Reptiles, vol. ii. p. 269.

*Anema inermis* Günther, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 230.

*Habitat.*—East Indian seas.

#### VII. GENYAGNUS Gill.

*Uranoscopus* sp. *Cuv. et Val.*

*Anema* sp. *Günther.*

Head cuboid with its superior surface covered with osseous plates. Preoperculum unarmed; both the preoperculum and operculum are covered with the skin. Lower jaw entire beneath. *Chin with a barbel*; no intralabial filament. Body covered with extremely minute scales. Dorsal fin long and single, with no spines in front.

The present genus is distinguished among its allies by the form and armature of the head, the presence of a mental barbel and absence of an intralabial cirrus, and the condition of the dorsal fin. A single species is known as a native of New Zealand.

GENYAGNUS MONOPTERYGIUS Gill.

*Uranoscopus monopterygius* Bloch, *Schneid.*, Systema Ichthyologia, *Schneid.* ed., p. 49.

*Uranoscopus cirrhosus* *Cuv. et Val.*, Hist. Nat. des Poissons, vol. iii. p. 314.

*Uranoscopus Forsteri*, *Cuv. et Val.*, Hist. Nat. des Poissons, vol. iii. p. 318.

*Uranoscopus kouripouia* Lesson, Voyage de la Coquille, Poissons, pl. xviii.

*Ichthyoscopus cirrhosus* } *Swainson*, Natural History of Fishes, Amphibians

*Ichthyoscopus Forsteri* } and Reptiles, vol. ii. p. 269.

*Uranoscopus maculatus* (*Sol. MSS.*) Richardson, Voyage of the Erebus and Terror, p. 54, pl. xxxiii. figs 1—3.

*Anema monopterygium* Günther, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 230.

#### VIII. GNATHAGNUS Gill.

*Uranoscopus* sp. *auct.*

Head with the osseous compartments of its superior surface mostly separated by smooth intervals. Preoperculum not armed with spines beneath; with about three osseous branches radiating behind and upwards from near its angle. Operculum extended backwards. Lower jaw with a short plectroid, enlargement, directed forwards, preceded in front by an emargination. Intralabial filament and mental barbel absent. Body covered with very small scales. Dorsal fin without spines, shorter than usual, and nearly coterminous with the anal, which is of ordinary size. The lateral line is quite distant from the dorsal fin.

*Gnathagnus* is one of the most decidedly distinct of any of the genera of *Uranoscopinae*. It is especially distinguished by its more slender body, the armature of the head, the peculiar short sabre-like dilations of the lower jaw, the great development of the operculum, and the condition of the dorsal fin.

GNATHAGNUS ELONGATUS Gill.

*Uranoscopus elongatus*, Temminck et Schlegel, Fauna Japonica, *Pisces*, p. 28, pl. ix. fig. 2.

*Anema elongatum* Günther, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 230.

*Habitat.*—Japan.

#### LEPTOSCOPINÆ Gill.

*Leptoscopinae* Gill, Proceedings of the Academy of Natural Sciences of Philada., 1859, p. 133.

The body is elongated and covered with moderate or rather small scales. 1861.]

The lateral is only arched before, and for most of its course is straight and nearly central between the dorsal and abdominal outlines.

The head is cuboid, and covered with the naked and smooth skin.

The anus is situated far forwards. The anal fin commences close behind and is very long, having about thirty or more rays. The ventral fins are jugular, and each has a spine and five branched rays.

#### I. LEPTOSCOPUS Gill.

*Leptoscopus Gill*, Proceedings of the Academy of Natural Sciences of Philadelphia, 1859, 133. *Günther*, Catalogue of Acanthopterygian Fishes, &c., vol. ii. p. 231.

*Uranoscopus sp. Richardson*.

Head above little longer than wide. Preoperculum not armed. Operculum fringed behind. Lower jaw entire beneath. No intralabial filament nor mental barbel. Villiform teeth present on the vomerine and palatine bones, as well as on the jaws. Branchial apertures only partially open above. Scales of the lateral line largest. Dorsal fin with no spines, commencing behind the vertical of the anus.

A single species of this genus has been discovered in the Australian seas, at Port Jackson.

LEPTOSCOPUS MACROPYGUS Gill.

*Uranoscopus macropygus Richardson*, Voyage of the Erebus and Terror, Fishes, p. 55, pl. 33, figs. 4, 5, 6.

*Leptoscopus macropygus Gill*, Proceedings of the Academy of Natural Sciences of Philada., 1859, p. 133.

#### II. CRAPATALUS Günther.

*Crapatalus Günther*, Annals and Magazine of Natural History, ser. iii. vol. vii. p. 86, Feb. 1861.

Head above little longer than wide. Preoperculum unarmed. Margin of the operculum fringed. Lower jaw entire. No intralabial filament nor mental barbel. Villiform teeth present only on the jaws; palate smooth. Branchial apertures partially open above. The dorsal fin has no spines, and commences behind the vertical of the anus.

This very interesting genus has been recently made known by Dr. Günther, by whom it was described in the "Annals and Magazine of Natural History." It affords additional evidence, if any more was needed, of the propriety of the approximation of the genus *Dactyloscopus* to the Leptoscopinæ. Although the only distinctive character of great value which now distinguishes the latter group is the condition of the ventral fins, I still regard it as representing a distinct subfamily. The modification of the ventral fins is of greater value in the family of Uranoscopoids than the dentition. As we might expect to find a variation in the latter character, on account of the known affinities of the family, so have we not been totally unprepared to discover the anomalous and blennoid structure of the ventral fins of *Dactyloscopus*. That genus, as I had at first supposed, would not improbably be regarded as a Blennoid, but the reference of the genus to that family, simply on account of the presence of only three articulated and unbranched ventral rays, would violate all natural affinities.

CRAPATALUS NOVÆ ZELANDIÆ Günther.

*Crapatalus Novæ Zelandiæ, Günther*, Annals and Magazine of Natural History, ser. iii. vol. vii. p. 86, pl. x, fig. A.

*Habitat*.—New Zealand.

#### DACTYLOSCOPINÆ Gill.

*Dactyloscopinæ Gill*, Proceedings of the Academy of Natural Science of Philadelphia, 1859, p. 133.

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The body is elongated and covered with moderate or rather small scales. The lateral line is arched only in front, and for most of its length, course nearly at equal distances from the dorsal and abdominal surfaces.

The head is cuboid, and covered with the smooth and naked skin.

The anus is placed far forward. The anal fin commences close behind, and is very long, having nearly thirty or more rays. The ventral fins are jugular, and each composed of about three simply articulated and unbranched rays.

DACTYLOSCOPUS Gill.

*Dactyloscopus Gill*, Proceedings of the Academy of Natural Sciences of Philadelphia, 1859, p. 132.

Head above longer than wide. Preoperculum unarmed. Posterior margin of the operculum fringed. Operculum, suboperculum and interoperculum with membranous extended borders. Lower jaw entire. No intralabial filament nor mental barbel. Villiform teeth only on the jaws. Dorsal fin unarmed.

It may not be deemed unnecessary to add that the family characters above given apply entirely to this genus, and that the branchial apertures are equally widely extended, that the branchiostegal membrane is doubled in front, and that the lips are fringed as in the other members of the family. In all of those characters it differs much from any of the Blennoids.

The genus *Dactyloscopus* was originally established on a species found at Barbados. Mr. Poey, the learned Professor in the University at Havana, has, in his correspondence, informed me that he has obtained two species in Cuba, at least one of which appears to be new. Another species has been discovered by Mr. Xantus, at Cape St. Lucas, and the specimens are preserved in the Museum of the Smithsonian Institution. They will be described on a future occasion.

DACTYLOSCOPUS TRIDIGITATUS Gill.

*Dactyloscopus tridigitatus Gill*, Proceedings of the Academy of Natural Sciences of Philadelphia, 1859, p. 132.

*Habitat*.—Caribbean Sea.

Descriptions of forty-nine New Species of the Genus **MELANIA**,

BY ISAAC LEA.

During the past and present years, I have read several papers describing new species of *Unionide* and *Melanide*, kindly sent to me by E. R. Showalter, M. D., of Uniontown, Alabama, a Correspondent of our Academy, who has been unremitting in his exertions to make known the natural history of that part of the State. In these papers there were few species of the genus *Melania*. They were purposely delayed with a view to bring them as much together as possible; and the present paper will exhibit the vast expansion there of Zoological life in this single genus, the Coosa River really appearing to be the Zoological centre of this particular group.

The great variety of form, color and size will at once strike the Naturalist, and he will be surprised in the examination of these forms to observe how few there are of tuberculate or plicate species, which so well characterise the members of the same family, in the streams which form the Tennessee and Cumberland rivers at no great distance.

**MELANIA HARTMANIANA**.—Testâ lævi, conicâ, magnâ, vel tenebroso-cornicâ vel tenebroso-oliva, valdè vittatâ, imperforatâ; spirâ obtusè conicâ; suturis valdè impressis; infractibus subplanulatis, instar septenis, ultimo grandi; aperturâ grandi, ovato-rhomboideâ, intus brunneo-vittatâ, ad basim obtusè angulatâ: labro acuto; columellâ incurvatâ.

*Hab.*—Coosa and Cahawba Rivers, Alabama. E. R. Showalter, M. D.  
1861.]

*MELANIA LEWISII*.—Testâ striatâ, subcylindraceâ, tenebroso-virente, valde vittatâ; spirâ subelevatâ, conoideâ; suturis valdè impressis; anfractibus planulatis, sulcatis, instar senis; aperturâ parviusculâ, ovato-rhomboidêâ, intus valdè vittatâ, ad basim obtusè angulatâ; labro acuto; columellâ albâ et incurvatâ.

*Hab.*—Coosa and Talapoosa Rivers, Alabama. E. R. Showalter, M. D.

*MELANIA ELLIPTICA*.—Testâ levî, ellipticâ, luteolâ, quadrivittatâ; spirâ brevî, obtusâ, ad apicem plicatâ; suturis impressis; anfractibus senis, subconvexis; aperturâ subgrandi, elongato-ellipticâ, intus quadrivittatâ, ad basim obtusè angulatâ; labro acuto; columellâ albidâ et incurvatâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D. and E. Foreman, M. D.

*MELANIA RUBICUNDA*.—Testâ valdè striatâ, rubidâ, subfusiformi; spirâ subelevatâ, conoideâ; suturis impressis; anfractibus instar senis, convexiusculis; aperturâ subconstrictâ, elongato-ellipticâ, intus rubidâ, ad basim obtuso-angulatâ; labro acuto; columellâ incrassatâ, rubidâ, incurvatâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

*MELANIA VESICULA*.—Testâ levî, ellipticâ, luteâ, immaculatâ, subtenui; spirâ brevissimâ, obtusâ; suturis subimpressis; anfractibus ternis, subconvexis; aperturâ grandi, regulariter ovatâ, intus dilute-salmonîâ; labro acuto; columellâ incrassatâ, incurvatâ, ad basim rotundatâ.

*Hab.*—Alabama. E. R. Showalter, M. D.

*MELANIA COOSAENSIS*.—Testâ striatâ, fusiformi, corneâ, quadrivittatâ, subcrassâ; spirâ subelevatâ, conicâ; suturis valdè impressis; anfractibus septenis, convexiusculis, sulcatis; aperturâ constrictâ, elongato-ellipticâ, intus albidâ, et quadrivittatâ; labro acuto, subcrenulato; columellâ paulisper incrassatâ, incurvatâ, ad basim obtusè angulatâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

*MELANIA GRACILIOR*.—Testâ striatâ, fusiformi, viridî-lutescente, subcrassâ; spirâ subelevatâ, conicâ; suturis irregulariter impressis; anfractibus septenis, vix convexis; aperturâ subconstrictâ, elongato-ellipticâ, intus albidâ; labro acuto; columellâ albidâ, infernè paulisper recurvâ, ad basim subrotundatâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

*MELANIA PROPRIA*.—Testâ levî, fusiformi, luteo-olivâ, quadrivittatâ, subcrassâ; spirâ obtuso-conoideâ; suturis impressis; anfractibus senis, convexiusculis; aperturâ subgrandi, elongato-ellipticâ, intus albidâ et vittatâ; labro acuto; columellâ inflectâ, albâ, ad basim subangulatâ.

*Hab.*—Alabama. E. R. Showalter, M. D.

*MELANIA NUBILA*.—Testâ striatâ, subellipticâ, obtusè conoideâ, tenebroso-virente, obscurè maculatâ vel latè vittatâ, subcrassâ; spirâ obtusè elevatâ; suturis irregulariter impressis; anfractibus senis, subinflatis, ultimo grandi; aperturâ subgrandi, rhomboido-ellipticâ, intus quadrivittatâ; labro acuto; columellâ arcuatâ, ad basim obtusè angulatâ.

*Hab.*—Coosa River, Wetumpka, Alabama. E. R. Showalter, M. D.

*MELANIA ORBICULA*.—Testâ striatâ, globosâ, subcrassâ, luteo-virente, quadrivittatâ; spirâ brevî, obtusâ; suturis valdè impressis; anfractibus quinis, valdè inflatis, ultimo grandi; aperturâ grandi, ellipticâ, intus quadrivittatâ; labro acuto; columellâ albâ, incurvatâ, ad basim obtusè angulatâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

*MELANIA CALCULOIDES*.—Testâ striatâ, subglobosâ, crassâ, corneâ, robustâ; spirâ conicâ, valdè obtusâ; suturis impressis; anfractibus senis, valdè infla-

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tis, ultimo grandi; aperturâ subgrandi, elongato-ellipticâ, intus albidâ; labro acuto; columellâ albidâ, incrassatâ, arcuatâ, ad basim retusâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

*MELANIA PUNICEA.*—Testâ lævi, subcylindraceâ, crassâ, puniceâ; spirâ elevato-conicâ; suturis impressis; anfractibus convexiusculis; aperturâ parvâ, rotundo-ovatâ, intus albâ; labro acuto; columellâ incrassatâ, albâ, ad basim rotundatâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

*MELANIA LUTEOLA.*—Testâ lævi, subellipticâ, subtenui, pallido-luteâ; spirâ subelevatâ, conoideâ; suturis paulisper impressis; anfractibus planiusculis; aperturâ subgrandi, intus albidâ; labro acuto; columellâ albidâ, incurvâ; ad basim obtuso-angulatâ.

*Hab.*—Alabama River. E. R. Showalter, M. D.

*MELANIA FASCINANS.*—Testâ lævi, subfusiformi, crassiusculâ, luteo-corneâ, nitidâ; spirâ elevato-conicâ; suturis impressis; anfractibus convexiusculis; aperturâ subgrandi, intus albâ, trivittatâ; labro acuto; columellâ albâ, ad basim retusâ.

*Hab.*—Yellowleaf Creek, Shelby County, Alabama. E. R. Showalter, M. D.

*MELANIA QUADRIVITTATA.*—Testâ lævi, subellipticâ, crassiusculâ, viridi-luteâ, nitidâ; spirâ obtusè conoideâ; suturis valdè impressis; anfractibus octonis, convexiusculis; aperturâ subconstrictâ, rhombo-ovatâ, intus albidâ, quadrivittatâ; labro acuto; columellâ incurvâ, ad basim angulatâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

*MELANIA MIDAS.*—Testâ lævi, cylindraceo-ellipticâ, crassiusculâ, virente, obsoletè vittatâ; suturis irregulariter impressis; anfractibus compressiusculis, ultimo pergrandi, infernè obsoletè striatâ; aperturâ grandi, auriculæformis, intus cæruleo-albâ; labro acuto; columellâ cæruleo-albâ, incrassatâ, inflectâ, ad basim obtusè angulatâ.

*Hab.*—Coosa and Alabama Rivers, near Wetumpka. E. R. Showalter, M. D.

*MELANIA VARIATA.*—Testâ lævi, subfusiformi, obtuso-conicâ, crassiusculâ, vel luteolâ vel purpurecente; suturis irregulariter impressis; anfractibus senis, supernè planiusculis, ultimo inflato; aperturâ grandi, intus vel luteolâ vel purpurecente; labro acuto; columellâ arcuatâ, inspissatâ, ad basim obtusè angulatâ.

*Hab.*—Coosa River, at Wetumpka and Montevallo, Bibb County, Alabama. E. R. Showalter, M. D.

*MELANIA VIRGULATA.*—Testâ lævi, fusiformi, conicâ, crassiusculâ, nitidâ, mucronatâ, luteolâ, quadrivittatâ; suturis subimpressis; anfractibus septenis, supernè constrictâ, ultimo bulboso; aperturâ subgrandi, subellipticâ, intus luteo-albâ et valdè vittatâ; labro acuto; columellâ inflectâ, ad basim angulatâ et canaliculatâ.

*Hab.*—Coosa and Tallapoosa Rivers, Alabama. E. R. Showalter, M. D.

*MELANIA MUCRONATA.*—Testâ lævi, acuto-conoideâ, tenui, diaphanâ, stramineo-luteâ; spirâ exertâ, mucronatâ; suturis leviter impressis; anfractibus senis, supernè planulatis; aperturâ parviusculâ, ovato-rhomboidèâ, intus luteo-albidâ; labro acuto, sinuato; columellâ ad basim paulisper incrassatâ, subeffusâ et subrecurvâ.

*Hab.*—Big Prairie Creek, Alabama. E. R. Showalter, M. D.

*MELANIA PROPINQUA.*—Testâ lævi, subcylindraceâ, subcrassâ, luteolâ, quadrivittatâ; spirâ subelevatâ, conoideâ; suturis valdè impressis; anfractibus

senis, supernè planiusculis; aperturâ ellipticâ, parviusculâ, intus albidâ et vittatâ; labro acuto; columellâ paulisper incrassatâ, infernè rotundatâ.

*Hab.*—Coosa and Cahawba Rivers, Alabama. E. R. Showalter, M. D.

MELANIA SUAVIS.—Testâ lævi, subfusiformi, subcrassâ, luteo-viridi, politâ, quadrivittatâ; spirâ obtuso-conica; suturis regulariter impressis; anfractibus senis, supernè planiusculis; aperturâ subgrandi, ellipticâ, intus albidâ et vittatâ; labro acuto; columellâ incurvâ, ad basim rotundatâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

MELANIA FALLAX.—Testâ lævi, pupæformi, obtuso-conoideâ, subcrassâ, vel tenebroso-fuscâ vel tenebroso-corneâ, obsoletè vittatâ vel evittatâ; suturis impressis; anfractibus septenis, convexiusculis, ultimo parvo; aperturâ parvâ, valdè constrictâ, elongato-ellipticâ; labro acuto; columellâ paulisper inflectâ, ad basim obtusè angulatâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

MELANIA CLAUSA.—Testâ lævi, pupæformi, obtuso-conicâ, crassâ, olivâ, vittatâ vel evittatâ; suturis valdè impressis; anfractibus septenis, convexiusculis; aperturâ parvâ, constrictâ, ellipticâ, intus albidâ; labro acuto; columellâ paulisper inflectâ, ad basim obtusè angulatâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

MELANIA PURPUREA.—Testâ lævi, subfusiformi, obtuso-conicâ, subtenui, tenebroso-rufâ; suturis paulisper impressis; anfractibus quinis, ultimo grandi; aperturâ subgrandi, ellipticâ, intus tenebrosâ; labro acuto; columellâ tenebrosâ, inflectâ.

*Hab.*—Alabama. E. R. Showalter, M. D.

MELANIA MELLEA.—Testâ lævi, subfusiformi, conica, crassiusculâ, melleâ, aliquandò vittatâ; suturis irregulariter impressis; anfractibus septenis, supernè planulatis, ultimo grandi, inflato; aperturâ grandi, rhomboido-ellipticâ, intus luteolâ; labro acuto; columellâ inerassatâ, inflectâ, infernè obtusè angulatâ.

*Hab.*—Coosa River, at Wetumpka, Alabama. E. R. Showalter, M. D.

MELANIA VARIANS.—Testâ lævi, vel plicatâ vel striatâ, elevato-conicâ, subcrassâ, luteolâ vel dilutè fuscâ, vittatâ; suturis impressis; anfractibus septenis, supernè planiusculis; aperturâ parviusculâ, ellipticâ, intus albidâ et vittatâ; labro acuto; columellâ albidâ, incurvatâ, ad basim obtusè angulatâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

MELANIA SHOWALTERII.—Testâ lævi, elevato-conicâ, subcrassâ, luteo-fuscâ, quadrivittatâ, suturis impressis; anfractibus instar senis, supernè planulatis, infernè subinflatis, ultimo subgrandi; aperturâ subgrandi, ovato-rhomboidicâ, intus albidâ et vittatâ; labro acuto et paulisper sinuato; columellâ albâ, inflectâ, supernè paulisper incrassatâ, ad basim subrotundatâ.

*Hab.*—Coosa and Cahawba Rivers, Alabama. E. R. Showalter, M. D.

MELANIA GLANDARIA.—Testâ lævi, obtuso-ellipticâ, crassâ, viridi-luteâ, quadrivittatâ; suturis valdè et irregulariter impressis; anfractibus septenis, convexiusculis, ultimo grandi; aperturâ elongato-ellipticâ, subconstrictâ, intus albâ et valdè vittatâ; labro acuto, subsinuoso; columellâ arcuatâ, supernè et infernè incrassatâ, paulisper canaliculatâ et contortâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

MELANIA PUDICA.—Testâ lævi, conoideâ, crassiusculâ, olivaceâ vel rufusculâ; suturis irregulariter impressis; anfractibus senis, convexiusculis; aperturâ parviusculâ, ovatâ, intus cæruleo-albâ; labro acuto; columellâ inflectâ, supernè incrassatâ, ad basim rotundatâ.

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*Hab.*—Yellowleaf Creek, Alabama. E. R. Showalter, M. D.

MELANIA SHELBYENSIS.—Testâ lævi, subellipticâ, subcrassâ, olivaceâ, vittatâ vel evittatâ; suturis impressis; anfractibus supernè planulatis; aperturâ parviusculâ, subovatâ, intus albâ; labro acuto; columellâ inflectâ, ad basim obtusè angulatâ.

*Hab.*—Yellowleaf Creek, Alabama. E. R. Showalter, M. D.

MELANIA ALABAMENSIS.—Testâ lævi, pupæformi, subelevatâ, subcrassâ, luteolâ, quadrivittatâ; suturis valdè impressis; anfractibus instar septenis, convexis; aperturâ parvâ, subconstrictâ, subellipticâ, intus albidâ et vittatâ; labro acuto; columellâ inflectâ, albidâ, ad basim obtusè angulatâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

MELANIA RARA.—Testâ lævi, elevato-conoideâ, scalariformi, subcrassâ, tenebroso-olivâ, nitidâ; suturis irregulariter impressis; anfractibus octonis, planulatis, supernè angulatis; aperturâ parviusculâ, ellipticâ, intus tenebroso-purpureâ; labro acuto; columellâ incurvâ, purpureâ, ad basim obtusè angulatâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

MELANIA BULLULA.—Testâ lævi, conoideâ, inflatâ, subtenui, viridi-luteâ, quadrivittatâ, suturis impressis; anfractibus instar quinis, inflatis, ultimo subgrandi; aperturâ subgrandi, latè ovatâ, intus albidâ et vittatâ; labro acuto; columellâ albidâ, supernè incrassatâ, sinuosâ, infernè subangulatâ.

*Operculum* elliptical, spiral, dark brown, with polar point near the base.

*Hab.*—Yellowleaf Creek, Shelby County, Alabama. E. R. Showalter, M. D.

MELANIA STRAMINEA.—Testâ lævi, regulariter ellipticâ, obtusè conoideâ, crassiusculâ, stramineâ; suturis impressis; anfractibus quinis, ultimo pergrandi et subinflatâ; aperturâ grandi, elongato-ellipticâ, intus luteo-albidâ; labro acuto; columellâ arcuatâ, supernè paulisper callosâ, ad basim obtusè angulatâ.

*Operculum* ovate, spiral, light brown, with the polar point near the edge towards the base.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

MELANIA SOLIDULA.—Testâ lævi, subfusiformi, obtusè conicâ, crassiusculâ, luteo-iridâ vel luteo-fuscâ, vittatâ; suturis impressis; anfractibus quinis, supernè planulatis, infernè rotundatis, ultimo grandi; aperturâ subgrandi, ovatâ, intus albidâ; labro acuto; columellâ arcuatâ, supernè paulisper callosâ, ad basim obtusè angulatâ.

*Hab.*—Yellowleaf Creek, near its junction with Coosa River, Alabama. E. R. Showalter, M. D.

MELANIA CAHAWBENSIS.—Testâ lævi, subfusiformi, elevato-conicâ, mucronatâ, subtenui, tenebroso-corneâ, obsoletè vittatâ; suturis linearibus; anfractibus octonis, supernè planulatis, ultimo subgrandi; aperturâ parviusculâ, ovatâ, intus albidâ vel luteolâ; labro acuto; columellâ arcuatâ, ad basim subrotundâ.

*Hab.*—Cahawba River, Alabama. E. R. Showalter, M. D.

MELANIA CULTA.—Testâ rugoso-striatâ, obtuso-conoideâ, inflatâ, subcrassâ, viridi-luteâ, nitidâ, trivittatâ; suturis valdè et irregulariter impressis; anfractibus septenis, supernè carinatis; aperturâ amplâ, subrhomboideâ, intus albidâ et vittatâ; labro acuto; columellâ incurvâ, dilutè roseâ, infernè angulatâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

MELANIA LITA.—Testâ rugoso-striatâ, pupæformi, conoideâ, subcrassâ, quadrivittatâ, variegatâ, nitidâ; suturis irregulariter impressis; anfractibus senis, 1861.]

supernè convexis, ultimo clongato; aperturâ subeonstretâ, elongato-ovată, intus purpureseente et vittatâ; labro acuto, spissato; columellâ infernè incurvatâ, purpureâ, ad basim rotundatâ.

*Hab.*—Cahawba River, Alabama. E. R. Showalter, M. D.

MELANIA COPIOSA.—Testâ striatâ, latè ellipticâ, ventricosâ, obtuso-conicâ, crassiusculâ, luteo-corneâ, obsolete vittatâ; suturis irregulariter impressis; anfractibus quinis, convexiuseulis, ultimo pergrandi; aperturâ copiosâ, latè ellipticâ, intus albidâ; labro acuto, sinuoso; columellâ arcuatâ, supernè paulisper incrassatâ, ad basim subrotundâ.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

MELANIA PERGRATA.—Testâ striatâ, subeylindraceâ, obtusè conicâ, crassiusculâ, viridi-corneâ, suturis valdè impressis; anfractibus senis, supernè numerosis, striis transversis erebrè indutis, ultimo pergrandi et eylindraceo; aperturâ grandi, elongato-ovată, intus albidâ; labro acuto; columellâ arcuatâ, supernè paulisper callosâ, ad basim subrotundatâ.

*Operculum*, ovate, spiral, dark brown, with the polar point on the edge near to the base.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

MELANIA BELLULA.—Testâ striatâ, subellipticâ, obtusè conoideâ, crassiusculâ, luteo-corneâ, quadrivittatâ; suturis valdè impressis; anfractibus instar quinis, convexiusculis, ultimo grandi; aperturâ subgrandi, ellipticâ, intus albidâ et vittatâ; labro acuto; columellâ albâ, inflectâ, ad basim obtusè angulatâ.

*Operculum* elliptical, spiral, dark brown, with the polar point near the inner edge, about one-fourth from the base.

*Hab.*—Yellowleaf Creek, Shelby County, Alabama. E. R. Showalter, M. D.

MELANIA ÆQUA.—Testâ substriatâ, conicâ, suberassâ, tenebroso-fuseâ, suturis impressis; anfractibus instar senis, supernè planulatis; aperturâ parvâ, rhomboideâ, intus albidâ; labro acuto; columellâ inflectâ, paulisper ierassatâ, ad basim obtusè angulatâ.

*Hab.*—Yellowleaf Creek, Alabama. E. R. Showalter, M. D.

MELANIA CAPILLARIS.—Testâ erebrè striatâ, angustè ellipticâ, crassiusculâ, luteo-fuseâ, striis transversis capillaris ereberrimè indutis; suturis irregulariter impressis; anfractibus subecompressis, ultimo grandi; aperturâ grandi, elongato-ellipticâ, intus striis capillaris; labro erenulato; columellâ albidâ, incrassatâ, incurvâ, ad basim obtusè angulatâ.

*Operculum* ovate, spiral, dark brown, with polar point near the inner side and near to the base.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D. and Wm. Spillman, M. D.

MELANIA GRATIOSA.—Testâ tuberculatâ, aliquando striatâ, obtuso-fusiforimi, crassiusculâ, luteo-iridî, vel vittatâ vel evittatâ; suturis impressis; anfractibus senis, superuè planulatis, ultimo grandi; aperturâ subgrandi, subrhomboideâ, intus albidâ; labro acuto, subsinuoso; columellâ inflectâ, incrassatâ, ad basim subangulatâ.

*Operculum* ovate, spiral, dark brown, with the polar point near the base.

*Hab.*—Coosa River, Alabama. E. R. Showalter, M. D.

MELANIA PAULA.—Testâ carinatâ, conicâ, tenui, diaphanâ, rufo-corneâ; suturis paulisper impressis; anfractibus senis, supernè acuto-carinatis, ultimo sub-biearinato; aperturâ parviusculâ, lato-ellipticâ, intus albidâ; labro acuto; columellâ vel albidâ vel rufeseente, inflectâ, ad basim acuto-angulatâ.

*Hab.*—Cahawba River, Alabama. E. R. Showalter, M. D.

MELANIA BLANDA.—Testâ pleiatâ, obtusè fusiformi, supernè obtusè conicâ, subtenui, tenebroso-corneâ; suturis impressis; anfractibus quinis, supernè

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planulatis, ultimo grandi et subangulato; aperturâ subgrandi, ellipticâ, intus luteo-albâ; labro acuto; columellâ incrassatâ, inflectâ, infernè subangulatâ.

*Hab.*—Yellowleaf Creek, Alabama. E. R. Showalter, M. D.

*MELANIA CREPERA.*—Testâ substriatâ, conicâ, subcrassâ, fuliginosâ; spirâ subelevatâ; suturis irregulariter impressis; anfractibus senis, convexiusculis; aperturâ ovato-rhombicâ, intus albâ; labro acuto; columellâ inflectâ, supernè paulisper incrassatâ, ad basim obtusè angulatâ.

*Hab.*—Yellowleaf Creek, Shelby County, Alabama. E. R. Showalter, M. D.

*MELANIA FUMEA.*—Testâ lævi, conicâ, subtenui, fumeâ, subnitidâ, aliquando obsoletè vittatâ; spirâ subelevatâ; suturis irregulariter impressis; anfractibus supernè planulatis, infernè subinflatis; aperturâ ovato-rhombicâ, intus albâ; labro acuto; columellâ inflectâ, supernè paulisper incrassatâ, ad basim subrotundâ.

*Hab.*—Yellowleaf Creek, Shelby County, Alabama. E. R. Showalter, M. D.

*MELANIA PROPRIA.*—Testâ lævi, clongato-ellipticâ, subtenui, luteo-corneâ, obsoletè vittatâ, nitidâ; spirâ elevatâ; suturis valdè impressis; anfractibus instar senis, supernè convexiusculis, infernè inflatis; aperturâ subgrandi, ovatâ, intus luteo-albâ; labro acuto; columellâ inflectâ, supernè incrassatâ, ad basim rotundatâ.

*Hab.*—Yellowleaf Creek, Shelby County, Alabama. E. R. Showalter, M. D.

The resignation of Dr. C. J. Cleburne, U. S. N., as a member of the Committee on Conchology, on account of absence on official duty, was read and accepted.

Permission having been obtained, Mr. Cope presented, on behalf of Mr. H. C. Wood, Jr., a large specimen (length 40 in.) of the iguana of Andros Island, one of the Bahamas. The animal had been mentioned by Catesby in his history of Carolina and the Bahamas, but had not apparently been noticed by any subsequent naturalist. The species was congeneric with, and allied to *Cyclura lophom a Gosse*, of Jamaica, but the crest was very low, and extensively interrupted over the shoulder and loins. The head plates differed from those of the Cuban species, *C. nubi a* and *Macleayi*. The color of the animal was black, with yellowish reticulations. The mastoid and gulo-rietal tubercles, dorsal crest, caudal whorls, middle of the abdomen, and antibrachium, were pink. The head and jaws light pinkish brown. Mr. Cope stated that a further account would shortly be given of the animal, under the name of *Cyclura ba eol o p h a*. The Academy Museum possesses, also, a fine individual of *C. pectinata Weg.* from Honduras, presented by Dr. J. L. Le Conte.

Mr. Cope presented a specimen of *Amblystoma Jeffersonianum Baird*, found near Thorndale, Chester Co., Pa. The species was very rare, having to the speaker's knowledge been previously only found in Western Pennsylvania and near Philadelphia. Dr. Hallowell was in error in regarding this species as identical with the *ingens* of Green, hence the mistake which the speaker had formerly fallen into,\* of quoting Tschudi's *Xiphonura* as applicable to the same type as Gray's *Heterotriton*.

Another specimen of an *Amblystoma* on the table, from Ohio, Mr. Cope observed had been regarded † as belonging to the *Salporphyrtica* of Green. Prof. Baird having shown that that species is the *Salmonea* of Storer, or *Pseudotriton salmoneus Baird*, he would call the Ohio species *Amblystoma microstomum*.

\* Proc. Acad. Nat. Sci. Phil 1859, p. 123.

† Op. cit. 1856, p. 8.

Of twelve species of Salamanders which were known to inhabit Chester Co., Pa., the following had been seen but once in the course of six years' search. *Spelerpes longicaudus*, *Plethodon glutinosus*, *Amblystoma punctatum*, *A. conspersum* and *A. Jeffersonianum*. *Hemidactylum scutatum* had been seen only twice, in two distant localities, both upon the same day.

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June 4th.

Mr. LEA, President, in the Chair.

Thirty-four members present.

The following papers were presented for publication :

"Descriptions of new species of *Cyrena*, *Corbicula* and *Sphærium*, by Temple Prime."

"Descriptions of new Palæozoic Fossils from Illinois and Iowa, by F. B. Meek and A. H. Worthen."

"Descriptions of new fossil Mollusca from the Cretaceous formation at Haddonfield, N. J., by Isaac Lea."

And were referred to Committees.

Mr. Gabb remarked, that a few days ago he had discovered an outcrop of the "Ripley Group" at the point where the West Jersey Railroad crosses Big Timber Creek, between Gloucester and Red Bank. The deposit forms the subsoil of the meadows, and appears to have been exposed in digging the ditches. It contains the usual characteristic fossils of this bed, and derives its principal interest from the fact that this locality is the nearest to Philadelphia of the fossiliferous portions of the Cretaceous formation yet announced.

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June 11th.

Mr. JOSEPH JEANES, in the Chair.

Twenty-three members present.

The following paper, being presented for publication, was referred to a Committee :

"Descriptions of two new species of fresh-water shells from Michigan, by Manly Miles."

Mr. Ennis exhibited two of the young of the *Kalemys Muhlenburgii*. They were found in a meadow near Haddonfield, in Camden County, New Jersey. They are of different stages of growth, and show very remarkably the relation of this genus to two other genera. The younger is spotted with small yellow spots similar to those of the *Nanemys guttata*. The older of the two is sharply sculptured with concentric grooves on all the plates of the carapace, similar to those of the *Glyptemys insculpta*. These facts help to show that, in a systematic arrangement, this genus—the *Kalemys*—should stand between the *Nanemys* and the *Glyptemys*, and this is actually the place assigned to it by Agassiz for other reasons; he, in his late elaborate treatise on the *Testudinata* says he had never seen the young of the *Kalemys*.

The spots on the head and neck of the young *Kalemys* are as numerous as those of the adult *Nanemys*. They are also of a bright lemon color, though two of the spots on the sides of the neck are larger and of the deep orange characteristic of this species. The spots on the carapace are of a dim dusky yellow. There is one on the middle of each plate except on the bordering

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plates of the sides, where, instead of being on the centre, they are situated on the inner margins. Although the specimen is very young—less than an inch in length—the spots are already wanting on some of the plates, probably vanishing with age.

This species is deeply interesting, and especially so to the members of this Society, on account of its very limited geographical distribution, being confined probably to a radius of about 50 miles from the city of Philadelphia. Probably it is in a slow progress towards extinction, and an entire disappearance from the earth; and hence it is plainly important to science that there should be an immediate investigation of the exact boundaries of its distribution, so that hereafter from time to time its course towards an ultimate annihilation may be clearly seen.

Besides being, as already known, one of the smallest of turtles—rather smaller than the *Nanemys guttata*—it is quiet and mild in its habits, not at all ferocious, though its food consists chiefly of insects, and in a smaller degree of vegetation. It frequents meadows in the vicinity of streams. As the cultivation of the land becomes more complete, its haunts will be diminished, its food lessened, and its numbers decreased.

While this genus is confined to a small distance of the borders of the Delaware River, the great confluent of the Delaware Bay, it is remarkable that a species of another genus—the *Ptychemys rugosa*—is confined to the confluent of the nearly adjoining Chesapeake Bay.

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June 18th.

Vice-President BRIDGES in the Chair.

Twenty-two members present.

An announcement was made of the death of Francis Peters, Esq., a member of the Academy, at Paris, France, on the 19th of May.

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June 25th.

Vice-President BRIDGES in the Chair.

Twenty-two members present.

On report of the respective Committees, the following were ordered to be published in the Proceedings:

Descriptions of new species of *Cyrena*, *Corbicula* and *Sphærium*.

BY TEMPLE PRIME.

1. *Cyrena Cypriæformis* Prime. C. testa ovato-suborbiculari, valde inaequaliterali, turgida, crassa, epidermide viridi-nigrescente vestita; umbonibus minimis, oblique antice curvatis, acutis, parum prominentibus; latere antico brevi, rotundato, postice subtruncato; lamina cardinali lata; dentibus cardinalibus elongatis, prominentibus, apice profunde furcatis; dentibus lateralibus brevibus, antice crasso, conico.

Long. 91; lat. 85; diam. 60 mill.

Hub.—Northern Australia. (Collect. Cuming et Prime.)

This large species is somewhat allied to the *Cyrena Cyprioides* Quoy; it is, however, less triangular in its general appearance, and its beaks are less inflated.

2. *Cyrena laevis* Prime. C. testa orbiculato-trigona, depressiuscula, inaequaliterali, tenui, minuta; epidermide viridi-glaescente vestita; regulariter transversim striata; latere antico obtuso, margine superiore postico con-

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vexo inferiore, arcuato; umbonibus parvis, depressis, obliquis, approximatis, detorticitis; ligamento elongato; valvis tenuis, intus candidissimis; cardine angusto, inaequaliter tridentato; dentibus cardinalibus obliquis minutis, mediano et postico dente valvae dextrae bifidis; dentibus lateralibus parum elongatis brevibus.

Long. 46; lat. 42; diam. 22 mill.

Hab.—Borneo. (Collect. Prime.)

This light and delicate species seems different from any other that has come under my notice.

3. *Cyrena regularis* Prime. C. testa ovato-rotundata, tumida, cordiformi, valde inaequilaterali; epidermide viridi vestita; latere antico acuto, postico subtruncato, latere supero posticali sulco sinuoso decurrente separato; umbonibus tumidis, brevibus; ligamento angusto; valvis intus albis; cardine utroque latere tridentato; dentibus cardinalibus obliquis, mediano et postico dente valvae dextrae bifidis; dentibus lateralibus brevibus, antico crasso, conico, apice acuto.

Long. 78; lat. 69; diam. 40 mill.

Hab.?—(Collect. Prime.)

Somewhat similar in general appearance to the *Cyrena Caledonica* Gassies; it is, however, anteriorly more angular, the body of the shell is more inflated, the beaks are more prominent, and the epidermis is smoother and more regular.

4. *Cyrena Siamensis* Prime. C. testa ovato-transversa, subtrigona, inaequilaterati, convexa, postice subtruncata, antice valde declivi, crassa, solida, in medio convexa; epidermide fusca induta; irregulariter striata; valvis intus albis; umbonibus depressis, brevibus, saepius erosis; dentibus cardinalibus tribus, obliquis, approximatis, fere parallelis, superne canaliculatis; dentibus lateralibus subaequalibus.

Long. 61; lat. 47; diam. 27 mill.

Hab.—Siam. (Collect. Cuming et Prime.)

Nearly allied to the *Cyrena Sumatrensis* Sowerby, from which it differs, however, in being less inflated, smaller and generally less ponderous.

5. *Cyrena Bernardiana* Prime. C. testa ovato-transversa, trigona, inaequilaterati, tumida, crassa, in medio ventricosa, margine superiore arcuato; epidermide viridi vestita; regulariter striata; umbonibus parvis elevatis; ligamento elongato, partim infosso; valvis solidis, intus candidissimis; cardine angusto, inaequaliter tridentato; dentibus cardinalibus angustis; dentibus lateralibus elongatis.

Long. 65; lat. 49; diam. 38 mill.

Hab.—New Caledonia. (Collect. Cuming et Prime.)

I dedicate this species to the Chevalier Bernardi of the Conchological Journal of Paris.

6. *Corbicula erosa* Prime. C. testa trigona, subaequilaterali, tumida, crassa, solida, transversim irregulariter striata; epidermide nigrescente vestita; latere antico brevi, postico obtuso; margine inferiore parum arcuato; umbonibus inflatis, erosis; cardine incrassato, tridentato; dentibus cardinalibus crassis; dentibus lateralibus aequalibus, serrulatis.

Long. 20; lat. 18; diam. 13 mill.

Hab.—Cambodia. (Collect. Cuming, Jay et Prime.)

Compared to the *Corbicula Lydigiana* Nobis, the only species to which it seems at all allied, it is less elevated, not so triangular in appearance, its lines of growth are less regular and deeper, its epidermis is darker and rougher.

7. *Corbicula brunea* Prime. C. testa ovato-transversa, subaequilaterali, extremitatis aequaliter obtusa, transversim striata, sulcis regularibus; epi-

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dermide brunea vestita; umbonibus parvis, integris, laevigatis; intus violacea; cardine tridentato; dentibus lateralibus aequalibus.

Long. 22; lat. 19; diam. 12 mill.

*Hab.*—Scamander River. (Collect. Prime.)

8. *Corbicula rhomboidea Prime*. C. testa ovato-transversa, subaequilaterali, tumidula, utraque extremitate obtusa, transversim striata, sulcis profundis et regularibus; epidermide fuscescens vestita; umbonibus tumidis, erosis; intus candida ad margines pallide coerulea; cardine incrassato, inaequaliter tridentato; dentibus lateralibus aequalibus, praelongis, tenuissime striatis.

Long. 24; lat. 21; diam. 14 mill.

*Hab.*—Malacca. (Collect. Cuming et Prime.)

Compared to the *Corbicula brunea Nobis*, it is heavier, more inflated, the beaks are fuller, both cardinal and lateral teeth are broader and stronger, the color of the interior of the valves is of a lighter shade; the epidermis is darker and the lines of growth are a little heavier.

9. *Corbicula notata Prime*. C. testa ovato-transversa, tumidiuscula, tenui, aequilaterali; utraque extremitate aequaliter obtusa; valvis intus viride violaceis; epidermide viridi vestita; transversim sulcata; sulcis distantibus; umbonibus parvis, turgidulis, integris; cardine angusto; dentibus cardinalibus tribus, inaequalibus, divergentibus; dentibus lateralibus angustis, arcuatis.

Long. 18; lat. 14; diam. 10 mill.

*Hab.*—Philippines. (Collect. Cuming, Jay et Prime.)

Very nearly allied to the *Corbicula tumida Deshayes*; it is, however, lighter of texture, more equilateral, less inflated, the beaks are smaller, the lines of growth are not quite so heavy and more numerous; the cardinal teeth are more distinct.

10. *Corbicula minor Prime*. C. testa ovato-transversa, depressiuscula, tenui, subaequilaterali, extremitatibus rotundata; umbonibus prominentibus, erosis; sulcis regularibus; epidermide virescente vestita; intus violacea; dentibus primariis crassis; lateralibus subaequalibus.

Long. 15; lat. 11; diam. 7 mill.

*Hab.*?—(Collect. Prime.)

Compared to the *Corbicula inaequilaterali Nobis*, this species is more equilateral and less elongated.

11. *Corbicula parvula Prime*. C. testa ovato-transversa, depressiuscula, tenui, aequilaterali, extremitatibus rotundata; umbonibus magnis, tumidis, erosis; sulcis irregularibus; epidermide viridi flavescens, irregulariter maculata vestita; intus pallide violacea; dentibus primariis crassis, lateralibus aequalibus.

Long. 12; lat. 10; diam. 5 mill.

*Hab.*—India. (Collect. Prime.)

12. *Corbicula subradiata Prime*.

*Cyrena subradiata* Kurr., in litt.

C. testa trigona, aequilaterali, compressiuscula, antice paulo latiore et obtusiore, striis regularibus, distantibus, epidermide viridi, nitente induta; intus pallide violacea; umbonibus minimis, acutis antice obliquatis, violaceo-subradiatis; cardine angusto, dentibus primariis crassis.

Long. 14; lat. 12; diam. 7 mill.

*Hab.*—India. (Collect. Prime.)

Very closely allied to the *Corbicula radiata Deshayes*, from the Nile, it differs in being less inflated, more oval shaped, the beaks are less full and more acute.

13. *Corbicula solidula Prime*. C. testa ovato-trigona, crassula, aequi-

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lateralis, tumidula; striis regularibus distantibus; epidermide flavescente induta; valvis solidiusculis, intus albis, umbonibus prominentibus, erosis, cardine crasso, tridentato.

Long. 11; lat. 10; diam. 6 mill.

*Hab.*?—(Collect. Prime.)

14. *Corbicula violacea Prime*. C. testa ovato-transversa, subaequilaterali, obliqua, extremitatibus aequaliter obtusa, transversim irregulariter striata; epidermide squalide virescente vestita; umbonibus magnis, obliquis, erosis, intus profunde violacea; cardine angusto tridentato.

Long. 15; lat. 13; diam. 8 mill.

*Hab.*?—(Collect. Jay et Prime.)

15. *Corbicula Agrensia Prime*.

*Cyrena Agrensia Kurr.*, in litt.

C. testa ovato-transversa, aequilaterali, laevigata, depressiuscula, extremitatibus rotundata; epidermide viridi-olivacea induta; sulcis regularibus, distantibus; intus pallide violacea; umbonibus tumidis, erosis; cardine angusto, dentibus cardinalibus crassis, lateralibus aequalibus, tenuiter serrulatis.

Long. 9; lat. 8; diam. 5 mill.

*Hab.*—Agra, India. (Collect. Prime.)

16. *Corbicula inaequilateralis Prime*. C. testa ovato-transversa, depressiuscula, tenui, inaequilaterali; extremitatibus rotundata; umbonibus prominentibus, approximatis, antice obliquatis, violaceo subradiatis; sulcis regularibus, intus pallide violacea; epidermide pallide virescente induta; cardine angusto; dentibus cardinalibus crassis, lateralibus inaequalibus.

Long. 16; lat. 12; diam. 8 mill.

*Hab.*—Africa. (Collect. Prime.)

17. *Sphaerium Vermontana Prime*. S. testa ovato-trigona, tumida, inaequilaterali, striis regularibus, epidermide viridi-flavescente vestita; umbonibus tumidis; cardine arcuato; dentibus lateralibus crassis.

Long. 11; lat. 10; diam. 7 mill.

*Hab.*—Vermont, N. America. (Collect. Prime.)

This species, though somewhat allied to *Sph. striatinum Lam.*, is much more inequilateral.

## Descriptions of new Palæozoic Fossils from Illinois and Iowa.

BY F. B. MEEK AND A. H. WORTHEN,

Of the Illinois State Geological Survey.

### ECHINODERMATA.

#### CRINOIDEA.

Genus PLATYCRINUS, Miller, 1821.

PLATYCRINUS OWENI.—Body rather large, cup-shaped, or sub-hemispherical below the summit of the first radials, rounded on the under side, height about two-thirds the breadth. Base saucer-shaped, or nearly four times as wide as high, pentagonal in outline, the sides being nearly straight or slightly concave, sutures anchylosed; columnar facet large, its breadth equalling about half that of the base, concave, margined by a slightly raised somewhat undulated rim, and perforated by a large central opening. First radial plates large, sub-quadrangular in general outline, but having the superior lateral angles truncated for the reception of the anal and interradial pieces, widening a little from the base upwards; facet for the reception of the second radial pieces

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prominent, near one-third as wide as the plate, and extending down between one-third and one-half its length. Second radial pieces small, extending out nearly horizontally from the first; round below, and presenting a pentagonal outline, as seen from the under side, supporting on their superior (outer) sloping sides, the two first divisions of the arms. First anal piece rather large for a species of this genus, apparently pentagonal, and extending down between the first radials, nearly as deep as the articulating facets supporting the second radial pieces. (Other parts unknown.)

The sutures separating the first radial plates from each other, and from the base, are rather distinctly canaliculated, in consequence of the beveling of the edges of the plates. The surface is finely granulose, and ornamented by small obscurely subnodose costæ, of which there are two on the base passing around near the margin. Three similar costæ ornament the first radial plates, being arranged parallel to the basal and lateral margins, but becoming nearly or quite obsolete above the middle.

Named in honor of Prof. Richard Owen, of the Geological Survey of Indiana.

*Locality and position.* Burlington, Iowa. Burlington Limestone. Collection of Mr. Charles Wachsmuth.

*PLATYCRINUS SCOBINA.*—Body rather small, cup-shaped or subtrubinate below the summit of the first radial pieces. Base basin-shaped, about twice as wide as high, and rather more than equalling one-third the height of the body to the top of the first radials; pentahedral in outline, with slightly concave sides, columnar facet less than one-third the breadth of the base. First radial plates slightly broader than high, widening a little upwards from the base, presenting a subangular outline, the superior lateral angles being truncated for the reception of the anal and interrarial pieces; facet for the reception of the second radial piece not protuberant, concave, rather less than one-third the breadth of the upper side of the first radial plates, and extending down about one-fifth their length. Second radial pieces small, triangular, and supporting on their superior sloping sides the first divisions of the arms. After dividing on the second radial pieces, the arms divide again on the second piece above, beyond which they are long, slender, and apparently simple. After the second bifurcation, they are each at first composed of a single series of wedge-shaped pieces, but gradually pass into a double alternating series of pieces, each of which is about as long as wide.

The surface of the basal and first radial plates is ornamented with numerous small, rather sharply elevated, irregularly arranged nodes, or coarse granules, so as to present a rasp-like appearance. The sutures are closely ankylosed in the base, and well defined between the first radial plates.

In its surface markings this species is much like *P. Wortheni* of Hall, but it differs in having a distinctly protuberant, instead of a flat or concave base, and in having but four arms to each ray, instead of eight or nine.

*Locality and position.* Burlington, Iowa. Burlington Limestone. Mr. Charles Wachsmuth's collection.

*PLATYCRINUS (PLEUROCRINUS) ASPER.*—Body small, rather deeply basin-shaped below the arms. Base much depressed, largely and deeply excavated below, with a narrow prominent marginal rim, which is notched at the sutures, and somewhat undulated. First radial plates broader than high, widening moderately upwards and presenting a subquadrangular outline, but really hexagonal, in consequence of the truncation of the superior lateral angles for the reception of the interrarial and anal plates; sinus in the summit of each, for the reception of the second radials, deep, semi-circular, and equalling about half the breadth of the upper side; surface of each ornamented by a very prominent, sharply elevated carina, which passes across near the lower side, and is waved or often broken up into isolated prominences. Second radial pieces triangular, wider than long, and

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nearly entirely received within the sinus, in the upper margin of the first radial pieces. First aual and first interrarial plates of apparently about the same size, the former connecting with a range of small plates above, which form the under margin of the lateral anal opening.

The arms, after the first division on the second radial plates, divide again on the second piece, above which the two inner branches bifurcate again on the second piece, thus making six arms in each ray seen in the specimen under description. Above the last division the arms are slender, very gradually tapering, and each composed of a double series of small alternating pieces, (excepting near the points of bifurcation,) and support on their inner side rather closely set ranges of tentacles. The column is a little compressed, and composed of rather thin pieces, with prominent crenulated margins near the base.

*Locality and position.* Burlington, Iowa. Burlington Limestone. Collection of Charles Wachsmuth.

#### Genus FORBESIOCRINUS, Koninck and Le Hon.

FORBESIOCRINUS MONROENSIS.—Body below the free arms apparently short-turbinate, or subglobose, composed of nearly smooth, rather thick plates, connected by linear sutures. Base small, and nearly hidden by the column. Subradial plates of moderate size, four of them pentagonal, and one on the anal side apparently hexagonal, with unequal sides. First radials about twice as wide as high, hexagonal in form, and nearly twice as large as the subradials. Second, third and fourth radials, in two of the rays, (and the fifth and sixth in another,) all nearly of the same length, hexagonal in form and about twice as wide as long. Last primary radial pieces of nearly the same size as the others, and supporting on their superior sloping sides the secondary radials.

Of the numerous interradians, the first is about the size of the subradial pieces, hexagonal in form, and supports two smaller pieces in the second range. Above these four or five occur in the next range, in one interrarial space, which is as far up as they can be counted in the specimen examined, though it is evident from the breadth of the interrarial spaces, that they must increase at the same rate for several ranges above. (Anal plates unknown.)

The column is rounded and comparatively thick at its junction with the base, from which it tapers gradually towards the lower extremity. Near the base it is composed of extremely thin, equal segments, connected by minutely crenulated sutures. Farther down it gradually passes into a series of alternately thicker and thinner pieces.

After the first division of the rays on the last primary radial pieces, the arms divide several times, and appear to give off lateral branches, but our specimen is not in a condition to enable us to determine how many pieces intervene between the points of division, nor do they show whether or not there are any interaxillary pieces.

The specimen before us presents the peculiar and anomalous appearance of having a small false arm arising directly from the summit of the upper truncated side of the largest subradial piece. It seems even to be inserted into a sinus in the upper side of the subradial, yet we can scarcely believe it is anything but one of the smaller divisions of the arms, accidentally broken off and placed in that position.

As near as we can determine from a description alone, this species appears to be somewhat closely related to *F. exculptus*, (*Onychocrinus exculptus*, Lyon and Cassiday, Am. Jour. Sci. vol. 29, N. S. page 78,) but differs in having less produced basal pieces, while the upper angles of the subradials are obtuse instead of "quite sharp." It also seems to have two or three more primary radial pieces in one ray than occur in any of those of the species described by Lyon and Cassiday. Again its surface appears to be smooth instead of granu-

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lose, and we have not been able to see any indications of the small patelloid pieces between the radial and arm pieces as in *F. exsculptus*.

*Locality and position.* River Bluff, near the south line of Monroe County, Illinois. Keokuk Limestone of the Lower Carboniferous series.

*FORBESIOCRINUS AGASSIZI*, var. *GIGANTEUS*.—This large Crinoid differs from the typical specimen of *F. Agassizi* (Hall), in having four instead of three plates in each secondary ray; (in three of the rays seen) while there are some differences in the number and arrangement of the anal and interradial plates. It also differs in having its column almost exactly cylindrical for a distance of at least four inches below the base, while that of *F. Agassizi*, is described as “rapidly tapering below the summit.” We suspect it may prove to be a distinct species from that described by Prof. Hall, but as it agrees with his description and diagram in most of its characters, excepting the points of difference we have mentioned, we merely call attention to it as a variety of that species, until we can have an opportunity to compare better examples of it with authentic specimens or figures of Prof. Hall’s species. Should it prove to be distinct, it can take the name *giganteus*, which would be very appropriate, since it is the largest species of that genus known, the length of its body to the commencement of its free arms being near 3·30 inches, and its breadth apparently about the same. Its arms are proportionally short, and bifurcate frequently.

*Locality and position.* Burlington, Iowa. Burlington Limestone.

#### Genus ACTINOCRINUS, Miller, 1821.

*ACTINOCRINUS DODECADACTYLUS*.—Body rather small, subglobose; summit and calyx below the arms of nearly the same size; breadth a little greater than the height; composed of slightly convex, smooth or subgranulose plates, which are connected by moderately distinct sutures. Base small, much depressed or subdiscoidal, obtusely hexagonal in outline, with three other obtuse retreating angles at the sutures. First radial plates wider than long, three of them regularly hexagonal, and two heptagonal. Second radial pieces much smaller than the first, about twice as wide as long, and all quadrangular. Third radials a little larger than the second, all regularly hexagonal, the two lateral margins being very short, and the two superior sides each about equalling the base. In the two posterior rays, the third radial pieces each support on one of their superior sloping sides a large brachial piece, and on the other a secondary radial of near the same size, which, in its turn, supports two brachial pieces, making three arms to each of these rays; while in all the others, two brachial pieces rest directly upon the third radial, thus making only twelve arms in the whole series. The first anal plate is about as wide as the first radials, but a little longer, being longer than wide, instead of the reverse. It is regularly heptagonal, and supports on each superior lateral sloping side, a smaller heptagonal piece; while an elongated, coffin-shaped piece rests upon its short superior truncated side, between the two latter, and extends up, flanked on either side by the first brachials, to its connection with the summit. Each of the interradial spaces is filled by a single ovate, octagonal piece, about as large as the second and third radial pieces taken together.

The vault is composed of rather large, somewhat regularly arranged plates which are very nearly flat, the smaller ones all being on the anal side; the proboscis is small, and located nearer the anal than the dorsal side.

Height to base of proboscis, 0·50 inch; breadth, 0·58 inch; breadth of base, 0·23 inch.

*Locality and position.* Burlington, Iowa. Burlington Limestone.

*ACTINOCRINUS PYRIFORMIS*, var. *RUDIS*.—*Actinocrinus pyriformis*, Shumard, 1855, Geol. Report of Missouri, p. 192, pl. A, fig. 6, a, b.

Body exclusive of the proboscis pyriform, being very narrow and apparently 1861.]

cylindrical from the base to the top of the third radial plates, above which the secondary radial and brachial pieces curve abruptly outwards to the base of the arms, so as to form with the ventricose summit a much expanded visceral cavity, entirely above the basal and primary radial plates. Base unknown; first radials unknown, excepting from some remaining portions of their upper ends, which show that they are comparatively large. Second radials very small, a little wider than long, (those seen) irregularly pentagonal in form, one of the sides being much shorter than the others. Third radials as long as the first, and nearly one-third wider, (the only two visible in our specimen,) hexagonal in form, and each supporting on its superior sloping sides two secondary radials of about its own size. Each of these is surmounted by a somewhat larger second secondary radial, which in its turn supports two first brachial pieces, each of which is succeeded by a second, from which the free arms are given off. The two series of secondary radials, and the four series of brachial pieces in each ray, connect laterally, so as to leave no room for interaxillary and interbrachial pieces. Interradial plates two or three, the first being about the same size as the second radials, and hexagonal or heptagonal in form. Above this there are one or two small pieces, of variable size and form, over which the secondary radials, and the lateral series of brachial pieces of the rays on each side, connect all the way up to the free arms, in such a manner as to leave no spaces for interradians above those just described. (Anal plates unknown.)

Dome hemispherical, composed of pentagonal, hexagonal, and heptagonal plates of nearly uniform size, each of which is provided with a spine-like tubercle. Proboscis central or nearly so. Arm openings twenty. Surface smooth or obscurely granulose; small rather pointed tubercles are also seen on the second and third radial plates, first interradians, and first secondary radials.

It is possible this Crinoid may be specifically distinct from *A. pyriformis*, of Shumard, but it agrees with it in so many respects that we do not feel fully warranted in regarding it as specifically distinct. Its most important differences are the sub-spiniferous character of its plates, and the possession of only two or three interradian plates, instead of six in each interradian space. It also differs in having a more ventricose dome, while the inferior half of its body is more abruptly contracted below the arms.

*Locality and position.* Salt Lick Point, Monroe County, Illinois. Where it occurs in beds of the same age as the Chouteau Limestone of Prof. Swallow.

*ACTINOCRINUS (AMPHORACRINUS?) CONCAVUS.*—Body small, subglobose, broader than high, a little oblique; summit nearly flat; under side rounded and distinctly concave, sides rising vertically or nearly so. Surface smooth or subgranulose. Base small, concave, and entirely included within the concavity of the under side. First radial plates comparatively large, convex, and curving under, so as to form a part of the concavity below; two of them heptagonal, and three hexagonal. Second radial pieces (wanting in two of the rays of the specimen before us,) wider than long, and quadrangular in form in the others.

Third radial pieces smaller than the second, (in three of the rays,) pentagonal in form, and each supporting upon its superior sloping sides the first brachial pieces, which form a part of the walls of the body. First interradian pieces, comparatively large, or about one-half the size of the first radial plates, nine-sided, the superior sloping sides of each supporting one side of two of the brachial pieces, while two very small pieces rest upon the middle of the summit, and connect with the vault above, and with the brachial pieces on each side. First anal piece a little larger than the first radials, heptagonal in form, and supporting in the next range three pieces, the two lateral of which are larger than the other, and connect above on their sloping sides, with brachial pieces, while the middle piece between these is irregularly hexagonal,

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and supports three very small pieces in the next range, which connect with the anal opening, and the vault pieces above, and with the brachials on each side. The vault is made up of a few comparatively large pieces, the central one of which is a little more convex than the others. The anal opening is very small, lateral, or about on the same horizon as the arm openings, and surrounded by only five plates, which are not protuberant. There are twelve small arm openings arranged around the margin of the summit, three to each of the posterior rays, and two to each of the others. The arms would appear, from the small size of the openings, and the very small articulating surfaces for the reception of the first free arm pieces, to be very slender and fragile. (Column unknown.)

Height of body, 0.31 inch., breadth from the anal to the anterior side, 0.42 inch.; breadth of base, 0.17 inch.

This is a very remarkable species, differing from any other *Actinocrinus* known to us, in the concavity of the under side, and the incurved character of its first anal, and first radial pieces. Its under side presents much the appearance of *Zecrinus*, though in the number and arrangement of the parts composing the whole body it will be seen to possess all the essential characters of the great genus *Actinocrinus* as it is now understood. We place it provisionally in the sub-genus *Amphoracrinus*, on account of the lateral position of the anal opening, but we suspect it should be made the type of a distinct sub-genus. It differs from *Agaricocrinus*, in having comparatively much larger first radial pieces, as well as in the general form of its body, and its much smaller arms, which are also located around the summit, instead of around the lower part of the body.

We are under obligations to Mr. Charles Wachsmuth, of Burlington, Iowa, for the use of the only specimen we have seen.

*Locality and position.* Burlington, Iowa. Burlington Limestone, of the Lower Carboniferous series.

**ACTINOCRINUS (PRADOCRINUS ?) AMPLUS.**—Body large, unshaped, composed of thin, smooth, or finely granulose plates. Base comparatively small, somewhat spreading; columnar facet large, or between one-half and two-thirds as wide as the base, having a small marginal rim. Column strong, round, and composed of thin segments near the body, where it has a very minute round central cavity. First radial plates rather large, a little longer than wide, and all apparently hexagonal, there being no distinct angle at the middle of those alternating with the basal pieces. Second radial plates about two-thirds as large as the first, nearly or quite as wide as long, and all hexagonal. Third radials a little smaller than the second, hexagonal and heptagonal in form, and supporting on their superior sloping sides the two first brachial pieces, which are comparatively large, and each succeeded by three or four much smaller short brachials, before the arms pass into double alternating ranges of small pieces. The first anal plate is as large as the first radials, pentagonal in form, and supports two subhexagonal pieces in the next range, above which there are some twelve or thirteen other smaller pieces of various forms. The first interradial plates are a little larger than the second radials, irregular hexagonal, and each surmounted by two rather small pieces in the second range, and three in the next, over which there are six or seven still smaller pieces, making eleven or twelve in each interradial space.

After the division of the rays on the third primary pieces, the brachials above the first pair curve nearly horizontally outwards, but are included so as to form a part of the walls of the body. Beyond the fourth or fifth brachial, the arms consist of a double row of small alternating pieces, of which there are eight or ten ranges, to a point where the first bifurcation of the free arms takes place.

Beyond this division, the arms continue to be strong, rounded, and each composed of a double series of short alternating pieces, though the specimen  
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under examination is not in a condition to show whether or not there were any other bifurcations. They all extend out nearly horizontally at first, and gradually curve upwards. Resting upon the inner sloping sides of each pair of first brachial pieces, there is a rather large interaxillary piece, with three or four much smaller pieces above.

The vault is moderately convex, and composed of innumerable minute pieces, and is provided with a central, or sub-central proboscis. It appears to have continued out over the anus as far as to the third or fourth ranges of small alternating arm pieces.

This species evidently belongs to the same group as that on which M. de Vernuil proposed to establish the genus *Pradocrinus*, which Prof. Koninck thinks does not differ from *Ctenocrinus* of Bronn.

*Locality and position.* Burlington, Iowa. Burlington Limestone. Collection of Mr. Charles Wachsmuth.

**ACTINOCRINUS SILLIMANI.**—Body of moderate size, distinctly stelliform, or pentalobate, as seen from below or above, in consequence of the deeply sinuous character of the interradian and anal spaces; rapidly spreading from the base to the third radials, which, with the secondary and tertiary radials, and brachial pieces, extend out horizontally. Summit nearly flat and provided with a rather small sub-central proboscis. Basal pieces short, thickened and projecting down over the summit of the column, so as to form a distinctly trilobate rim, deeply indented at the sutures; columnar facet concave, and rather less than one-third the breadth of the base. First radial plates about as large as the anal pieces, very thick and prominent; wider than high, three of them heptagonal, (the angle at the middle of the under side being very obtuse,) and two hexagonal. Second radial pieces smaller than the first, thick and prominent, wider than high, and hexagonal in form. Third radials about the size of the second, wider than long, heptagonal or hexagonal, and supporting on each superior sloping side a secondary radial. Each of the latter supports on its outer side a series of brachial pieces, and on its inner side tertiary radials, on the second of which another bifurcation takes place, making six arms to each ray, or thirty in the entire series. The two secondary, and the four tertiary radials, as well as two or three of the brachial pieces on each side of them, are covered in above by vault pieces. The first anal plate is hexagonal, and nearly as large as the first radial pieces. In the next range above, it supports two smaller hexagonal pieces, which in their turn support three pieces in the next range, the middle one of which is larger and longer than the others. On each side of this larger middle piece, there are two other smaller pieces resting upon the two lateral pieces of the third range, and connecting with the vault above, and with the brachial pieces on each side. The first anal plate is regularly hexagonal, and supports two smaller pieces in the second range, over which there are three or four still smaller pieces connecting with the vault above.

A marked feature of this species is the prominence, and very profound sculpturing of its plates. Its first radial and first anal pieces rise into elevated transverse nodes, which occupy nearly their entire surface, and project beyond the base, so as to present a distinct six-lobed outline, as seen from below. From the under side of each of these prominences, one or two short ribs connect with the base, while similar ribs connect them with each other on each side. A single, rather prominent rib also passes from each to a smaller node on each second radial piece above.

The two second anal pieces, and all the first interradians are provided in the middle with a rounded, rather small, very prominent subspiniferous node. The third radial pieces have a central prominence, connecting by short carinæ with the node on the second radial below, as well as with each of the secondary radials above. On the latter pieces, these carinæ bifurcate, and extend along the tertiary radial and lateral brachial pieces, leaving deep depressions

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between. The upper anal and interradial plates are convex, but do not generally rise into distinct nodes.

Named in honor of the venerable Prof. B. Silliman, Sr., of New Haven, Connecticut, who perhaps did more to create an interest in scientific studies and pursuits, at an early period in the history of this country, than any other person now living.

*Locality and position.* Clear Creek, Warren County, Illinois. Burlington Limestone.

#### Genus AGARICOCRINUS, Troost.

*AGARICOCRINUS GRACILIS.*—Body small, truncato-subglobose exclusive of the arms; under side concave, the concavity extending out to the middle of the second radial, first interradial, and second range of anal pieces, all of which are geniculated, or abruptly bent upwards, and swollen, so as to form a circle of hemispherical nodes around the margins of the concave under side.

Anal and interradial pieces rising vertically from the margins of the concavity below. Dome rather depressed, and provided with a short, strong, sub-central spine. Anal opening small, not protuberant, and placed about on a level with the arm openings, which are located slightly above the middle of the entire body, including the dome.

Base small, concave, nearly or quite hidden by the column. First radial plates flat, included within the concavity of the under side, about as wide as long, and apparently all hexagonal. Second radials slightly larger than the first, and quadrangular in form. Third radial pieces shorter and wider than the second, and each provided with an obtuse mesial ridge, which connects with the prominence of the second radials below; sub-heptagonal in outline, the superior angle being rather salient, and the slopes on each side supporting the first brachial pieces. First interradial pieces larger than the first or second radial plates, wider above the geniculation than below; irregularly octagonal in form, and supporting two smaller elongated pieces in the next range above. First anal plate small, and included within the concavity of the under side; supporting in the next range three larger pieces, the middle one of which is smaller than the other two. Above these five smaller pieces are seen in the next range, which is as far as they can be counted in the specimen examined. After the first division on the third radial pieces, the arms are each at first composed of a single nodose brachial piece, but almost immediately pass into a double series of short alternating pieces, which support a closely set range of tentacles on each side within. As they do not bifurcate again, there are but two arms to each ray, or ten in the entire series. Near the base the column is rather slender, round, and composed of alternately thicker and thinner plates, with a very small round central perforation. The surface is finely and regularly granulose where well preserved, but generally appears to be smooth.

*Locality and position.* Burlington, Iowa. Burlington Limestone. Collection of Mr. Charles Wachsmuth.

*PLATYCRINUS MULTI-BRACHIATUS.*—Body below the summit of the first radial pieces depressed, basin-shaped. Base discoid, pentagonal in outline, moderately concave below, and not prominent enough to be seen in a side view; columnar facet about one-third as wide as the base. First radial plates large, broader than high, and widening rather rapidly upwards from the base; facet for the reception of the second radial pieces prominent, extending down apparently below the middle of the plate. Second radial pieces small, triangular, wider than long, and extending obliquely outwards and upwards from the first radials.

After dividing on the second radials, the arms bifurcate again on the second piece, and the two inner divisions, which are larger than the others, bifurcate again on the second piece, above which two of the sub-divisions in some of the  
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rays again divide once more, making seven rays to some of the arms and eight to others. The arms are rounded, very gradually tapering, and each composed of a double series of alternating pieces, supporting tentacles within. The sutures separating the first radials, as well as those between them and the base, are rather distinctly grooved, as well as those between the succeeding pieces, up to the last bifurcation of the free arms.

The surface of the first radial plates is rather concave, and between the projecting margin of the sinus above, and the marginal grooves; the concave space being sometimes marked by very faint traces of small radiating corrugations. Very small longitudinal obscure striæ or wrinkles, can also be seen by the aid of a magnifier on the outer side of the arms, above the last divisions.

This species is allied to *P. corrugatus* of Owen and Shumard, but differs in the style of its surface markings, being in fact nearly entirely smooth. It also differs in having a distinct marginal groove along the sides and base of its first radial plates. Its body is also proportionally higher to the summit of the first radials.

*Locality and position.* Burlington, Iowa. Burlington Limestone. Collection of Mr. Charles Wachsmuth.

#### Genus CYATHOCRINUS, Miller. 1821.

CYATHOCRINUS WACHSMUTHI.—Body depressed, obconical, or subturbinate. Base of moderate size, low, and distinctly pentagonal, the angles formed by the extremities of the plates a little incurved. Columnar facet covering about one-third to one-fourth of each basal piece. Column obscurely pentagonal near the base, the angles being rounded; central perforation comparatively large and pentagonal. Subradial plates five or six times as large as the basal pieces, about as long as wide, three of them hexagonal, and two on the anal side heptagonal, all indented or incurved at the sides and at the upper angles. First radials larger than the subradials, unequal in size, and wider than long; all heptagonal, in consequence of the truncation of the superior lateral angles apparently for the reception of small terradials, each having the angles below distinctly indented, and upper side truncated, and moderately concave for the reception of the succeeding plates. Second radials very short or nearly linear, and about two-thirds as wide as the first. Third radials generally a little narrower, and longer than the second, and apparently triangular in form. Sub-anal piece comparatively large, quadrangular, and indented at the angles; first true anal plate larger than the sub-anal piece, heptagonal in form, resting upon a very short upper truncated side of one of the subradials, and connecting on each side with the first radials; its right inferior sloping side also resting against the sub-anal piece. The arms after dividing on the third radials, are strong and rounded on the outer side; one of the divisions in each of the rays, excepting anterior one, bifurcates again on the fourth piece. All the divisions and subdivisions are rounded, gradually tapering, and composed each of a single series of pieces as long as, or a little longer than wide, and giving off at intervals of two or three pieces alternately on opposite sides, rather strong jointed lateral divisions, which extend obliquely outwards and bifurcate several times. The surface seems to be merely irregularly granulose. On examining it closely, however, traces of very small radiating slightly raised lines are seen on the subradial and radial plates, as well as extending up the principal divisions of the arms.

We take pleasure in dedicating this species to Mr. Charles Wachsmuth, of Burlington, Iowa, to whom we are indebted for the use of the specimen described.

*Locality and position.* Burlington, Iowa. Burlington Limestone of the Lower Carboniferous series.

#### Genus BURSACRINUS, N. G.

(*βυρσα* a purse; *κρινος* a lily, in allusion to the purse-like form of the typical species, as seen with its arms folded together.)

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*Generic formula.*

Basal plates, 5 ?

Subradial plates, 5 ; four hexagonal and one pentagonal.

Radial plates,  $2 \times 5$ .

Anal plate, 1.

Interradial plates, none.

Arms, 10, bifurcating.

The crinoid upon which we propose to found this genus, has much the appearance of an *Ichthyocrinus*, with which genus it seems to agree, excepting in having true subradial plates, and but two, instead of three primary radial plates in each ray ; also in the possession of a distinct anal plate.

Notwithstanding its general similarity to *Ichthyocrinus*, its structure is more nearly like that of *Cyathocrinus*, from which it differs mainly in having only two, instead of three primary radial pieces in each ray, and much broader and flatter arms, which connect laterally as in *Ichthyocrinus*, so as to leave no interradian spaces.

*BURSACRINUS WACHSMUTHI*.—Body below the summit of the first radial plates rather broad turbinate, or rapidly expanding from below. Base unknown. Subradial plates of moderate size, a little wider than long, and all hexagonal, excepting one on the anal side, which is larger than the others, and heptagonal in form ; the angles at the middle of the under side of each being less salient than that above. First radial plates about one-third larger than the subradials, near twice as wide as high, and all pentagonal, the upper side being transversely truncated. Second radial pieces of the same size and form as the first, but inverted so as to bring the truncated side below ; supporting on their superior sloping sides the first divisions of the arms, which are broad, flat, and connected laterally with each other all around. Anal piece rather small, longer than wide, heptagonal, the angle at the middle of the summit being more salient than the others ; supported upon the short truncated upper side of one of the subradials, and connecting on each side with the first and second radial plates, and the first of the broad secondary radial or arm pieces above.

After the first division on the second radials, the arms bifurcate again on the sixth or eighth piece, above which one is seen to bifurcate again on the twelfth piece, which is as far as they can be traced in the only specimen seen, though they seem to be long and probably bifurcate once or oftener above.

Between the divisions on the second radial pieces, and the next bifurcation above, they are very wide, flat, and composed of short, slightly wedge-formed pieces, which are squarely truncated on each side. The next divisions above these are a little more than half as wide, and composed of a single series of pieces bearing near the same proportions of length and breadth as those below. The surface is finely granulose, though there are no traces of nodes, costæ, or other prominences on any of the plates. The sutures are merely linear, and not impressed.

We take pleasure in dedicating this interesting species, (the type of a new genus,) to Mr. Charles Wachsmuth, of Burlington, Iowa, who discovered the only specimen we have seen.

*Position and locality.* Burlington Limestone. Burlington, Iowa.

## Genus POTERIOCRINUS, Miller, 1821.

*POTERIOCRINUS ? ENORMIS*.—Body small, irregularly cup-shaped ; sides somewhat convex, expanding from the base ; breadth greater than the height. Base small, spreading from the column, above which the plates are seen presenting small pentagonal faces. Subradial plates comparatively large, unequal, hexagonal in form, excepting one on the anal side, which is much larger than the others, and sub-heptagonal in outline. First radial plates

larger than the smaller subradials, longer than wide, and irregularly sub-hexagonal or heptagonal; facet for the reception of the second radials small, not protuberant outwards, shallow and about one-third as wide as the plates. Arms above the first radial pieces very slender, cylindrical, and composed of a single series of segments from twice to three or four times as long as wide. In some of the rays the first division takes place on the second, in others on the third, and in the anterior ray on the fourth piece above the first radials, after which they bifurcate irregularly once, twice, or oftener, on the second, third or fourth piece. The first anal plate is rather large, and rests upon the upper truncated side of the largest subradial plate, so as to project considerably above the first radials. Its left side curves inwards, and its right connects with another plate of nearly its own size resting upon a sloping side of the first radial on the right. Above these are seen several other plates, which form together a kind of slender lateral trunk, or proboscis, rising like an arm on a range with the true arms. Some little distance above, it curves in with its upper extremity between the arms, leaving at its base, on the left, a cavity or opening, passing apparently into the body between it and the first arm on that side.

The surface is finely granulose, and the sutures indistinct. The column is small, round, and composed of nearly equal, rather short joints, near the base.

A very marked feature of this species, is its peculiarity of having apparently a slender proboscis much like an arm, rising from the anal side, with an opening between its left side and one of the arms. This is so anomalous a character, that if we were sure it is not due to some accident, we would have regarded the species as the type of a new genus.

*Locality and position.* Burlington, Iowa. Burlington Limestone. Collection of Mr. Chs. Wachsmuth.

**POTERIOCRINUS SUB-IMPRESSUS.**—Body obconical. Base forming a shallow cup about twice as wide as high, expanding moderately from the summit of the column; composed of plates which are about as high as wide, and pentagonal in form, the angle at the middle of the upper side of each being a little indented. First radials somewhat smaller than the subradials, wider than long, pentagonal, or some of them hexagonal, and truncated above for the reception of the second radials. First anal or sub-anal plate, a little larger than the basal pieces, pentagonal, and resting between the upper sloping sides of two of the subradial pieces; second anal piece of the same size as the first, hexagonal in form, and resting upon the upper truncated side of one of the subradials, while its left side connects with one of the first radials, and its right with one side of the first anal piece, and with a third hexagonal piece resting upon it. (Succeeding parts unknown.)

The column is comparatively strong at its connection with the base, near which it is composed of rather thin segments, connected by crenulated sutures; its central perforation is of moderate size and pentagonal.

The surface seems to be granulose, and the subradial pieces show a very slight tendency to develop short costæ near the sutures on each side, and below, as well as sometimes at their connection with the first radials above.

The round indentations at the angles of the subradial and first radial plates, present a rather marked character in this species.

*Locality and position.* Burlington, Iowa. Burlington Limestone. Mr. Charles Wachsmuth's collection.

**POTERIOCRINUS TENUBRACHIATUS.**—Body small, calyculate, or turbinate below the summit of the first radial plates. Base small, forming a low pentagonal saucer-shaped cup, composed of small plates, showing a pentagonal outline above the column. Subradial plates rather large, about as wide as long, three hexagonal, and two on the anal side heptagonal, and a little longer than the

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others. First radial plates somewhat larger than the subradials, wider than long and pentagonal in form; facet for the reception of the second radials moderately prominent, a little concave, and from one-half to two-thirds the breadth of the plate. Anal plates three, the first (or subanal piece) hexagonal, and resting between the upper sloping sides of two of the subradial pieces, while another on the left rests against this, and upon the superior truncated side of one of the subradials. A third piece is supported on the upper truncated side of the subanal piece, and projects more than half its length above the first radial on its right. The succeeding primary radial pieces after the first, are distinctly smaller, and a little wider than long. In all excepting the anterior ray, where the bifurcation takes place on the fifth plate, the first division of the arms takes place on the fourth primary radial. Above this the arms, which are very long, slender and rounded, divide again on the fourth piece, after which the divisions bifurcate three or four times, and become very attenuate. Each division is composed of a single series of pieces, usually about twice as long as wide.

The proboscis connects directly with the anal plates already described, and is made up of hexagonal plates, along the sutures of which, distinct vertical ranges of rather large and distinct pores are seen. The entire surface is finely granulose. The sutures are linear and not grooved or impressed. This species is similar to *P. calyculatus* of Hall, but may be at once distinguished by its sutures not being excavated, and by its much more slender arms, which are composed of elongate, instead of short wedge-formed pieces.

*Locality and position.* Burlington, Iowa. Burlington Limestone. Collection of Mr. Charles Wachsmuth.

**POTERIOCRINUS CARINATUS.**—Body small, basin-shaped or rather rapidly spreading below the arms. Base very small, having the form of a pentagonal star, the angles of which project but slightly beyond the column. Subradial pieces small, about as wide as long, four of them hexagonal, (the form of the one on the anal side is not distinctly visible in the specimen examined;) all rather prominent, and provided with a vertical carina near the upper angle. First radial pieces about twice as large as the subradials, as wide again as high, and pentagonal in form, the upper side being truncated, and longer than either of the others. Second radials slightly larger than the first, wider than high, quadrangular, and a little constricted around the middle.

Third radials about the size of the first, pentagonal in form, and like the second slightly constricted, the upper angles being rather salient. The anal plates are not all preserved in the specimen before us, though we can see that the first or subanal piece is of moderate size, pentagonal in form, and extends so far down between two of the subradials, as to connect (apparently) by a very short side, with the produced extremity of one of the basal pieces. Its right superior sloping side supports one edge of a first radial above, and it evidently supported another piece on its superior truncated edge, while it connects on the left with another resting on the upper truncated side of one of the subradials.

After the first division of the third radials some of the arms bifurcate again on the fifth, sixth or seventh piece, while others seem to be simple. They are all composed of pieces which are a little constricted around the middle, as long as wide, and alternately longer and shorter on opposite sides, the upper extremity of the longer side of each being a little projecting for the reception of the tentacles, so as to give a zigzag appearance to the arms. The tentacles are large, and composed of rather long joints. Owing to the length of the arm pieces, and the fact that only every alternate piece on the same side supports a tentacle, they are very widely separated and alternately arranged.

The surface seems to be granulose, and each ray is provided with a distinct linear carina, commencing on the middle of each first radial piece and extend-

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ing up along each division of the arms to their extremities. The sutures between the primary radials seem to be a little gaping, as in *Scaphiocrinus*, to which the species appears to bear some relations in other respects. The anal side of the specimen being imperfect, we are left in some doubts in regard to the generic characters of this species. In some respects it seems to agree more nearly with *Cyathocrinus* than *Poteriocrinus*, though it evidently possessed more anal pieces than occur in the latter genus. The carinated character of its arms and primary radial pieces is a peculiarity that will readily distinguish it from any other species with which we are acquainted.

*Locality and position.* Burlington, Iowa. Burlington Limestone. Mr. Charles Wachsmuth's collection.

#### Subgenus SCAPHIOCRINUS, Hall, 1858.

POTERIOCRINUS (SCAPHIOCRINUS?) CARBONARIUS.—Body small, depressed or basin-shaped below the summit of the subradial plates, rounded and concave below, composed of thick, convex, smooth plates, which are connected by distinctly impressed sutures. Base small, concave, and pentagonal in outline. Subradial plates a little longer than wide, directed obliquely outwards from the base, and curving upwards at the extremities; all pentagonal, excepting one on the anal side, which is a little truncated at the upper extremity for the reception of one of the anal pieces; upper angle of each rather salient. First radials nearly twice as large as the subradial pieces, wider than long, pentagonal, or subheptagonal, the upper side being truncated, and concave on its outer slope. Second radial pieces nearly twice as long as wide, pentagonal in outline, rounded on the outer side, and distinctly constricted around the middle; supporting the first division of the arms on their superior sloping sides.

We are in some doubt in regard to the generic relations of this species, not having seen the arrangement of its anal pieces. It agrees with Prof. Hall's subgenus *Scaphiocrinus* in the elongated and constricted form of its second radial pieces, as well as in having the sutures between these pieces and the first radial plates widely gaping. It differs, however, from the typical forms of that group in having a concave base. It also seems to differ from *Scaphiocrinus*, as well as the typical forms of *Poteriocrinus* in apparently having between the second radials small interrarial pieces, yet we are not sure the pieces seen occupying the interrarial spaces may not be fragments of the arms that have accidentally been placed in this position. We suspect, however, it may belong to an undescribed genus, but prefer to place it in the genus *Poteriocrinus*, until we can see better specimens.

*Locality and position.* Near Springfield, Ill. Coal Measures.

POTERIOCRINUS (SCAPHIOCRINUS) SOLIDUS.—Body small but strong, calyculate or inversely bell-shaped below the top of the first radial plates; sides expanding rather gradually, with a slightly convex outline to near the middle of the first radial plates, above which they curve a little outwards. Base depressed, spreading from the summit of the column; pentagonal in outline, each piece showing a rather short pentagonal face above the column. Subradials about as wide as long, three hexagonal and two heptagonal. First radial plates nearly twice as large as the subradials, wider than long, and pentagonal in form, the upper side being transversely truncated and a little concave; second radial plate narrower than the first, longer than wide, pentagonal in form, (excepting in the anterior ray, which is simple,) and distinctly constricted around the middle.

First anal (or subanal) plate pentagonal, and resting between the upper sloping sides of two of the subradial plates; connecting on the left with another, which rests upon the superior truncated side of a subradial. The upper truncated extremity of the first anal or subanal plate supports a third

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piece, which extends nearly half its length above the first radial on its right. The arms above the first division on the second radial plates are strong, angular on the outer side, and (excepting in the anterior ray) bifurcate again on the sixth or eighth plate, beyond which they are simple, as far as they can be traced in the specimen under description. They are each composed of a single series of pieces, which are as long as wide, or somewhat longer, a little wedge-shaped, and alternately prominent or subnodose on opposite sides, so as to give the arms a somewhat zigzag appearance. The surface is finely granulose; and while the sutures are scarcely visible between the body plates, those between the first and second radials are distinctly gaping.

*Locality and position.* Burlington, Iowa. Burlington Limestone. Mr. Charles Wachsmuth's collection.

**POTERICRINUS (SCAPHICRINUS) WACHSMUTHI.**—Body small, inversely bell-shaped below the summit of the first radial plates, wider than high. Base small, scarcely visible in a side view, and extending a little beyond the summit of the column, which is round and composed of rather thin segments near the body. Subradial plates as wide as high, convex, four hexagonal and one heptagonal. First radial plates from one-third to one-half larger than the subradials, wider than long, truncated above and pentagonal in form, the upper side being longer than the others. Second radial pieces somewhat larger than the first, distinctly constricted around the middle, about as long as wide, and pentagonal in outline, the upper superior angle being rather acute. First anal plate larger than the subradials, hexagonal in form, resting upon the truncated upper side of one of the subradial pieces, and projecting nearly half its length above the first radial plates on each side of it. The arms, after the division on the second radial pieces, appear to be simple, very long, and gradually tapering. They are each composed of a single series of joints, all of which are longer than wide, somewhat constricted around the middle, and alternately longer and shorter on opposite sides, the upper extremity of the longer side of each projecting out for the reception of the tentacles, so as to give the arms a zigzag appearance. The tentacles are strong and composed of joints which are two or three times as long as wide, and distinctly grooved on the inner side.

The surface is granulose, and the sutures well defined; while at each corner of the subradial plates there is a deep round pit or depression. This species seems to be related to *S. spino-brachiatus* of Hall, but differs in the form of its body, and in having longer arm pieces, which are also without spines. It has remarkably long arms, and a neat symmetrical bell-shaped body below the first radials.

*Locality and position.* Burlington, Iowa. Burlington Limestone. Collection of Mr. Charles Wachsmuth.

### BLASTOIDEA.

Genus PENTREMITES, Say, 1820.

**PENTREMITES CORNUTUS.**—Body under medium size, subglobose, broader than high, the widest part being at the middle; upper and lower extremities truncated. Base deeply concave, and entirely within the concavity of the under side. Radial pieces long, or extending from the base of the body to near the summit; narrow, somewhat contracted above and below, and divided by the pseudo-ambulacral areas nearly four-fifths their entire length; all very thick and rising into prominent carinae on each side of the pseudo-ambulacral fields. Interradial pieces of moderate size, and each projecting out in the form of a very prominent, compressed horn-like process. Pseudo-ambulacral areas very narrow, or lance-linear, and deeply implanted between the very prominent, carinated forks of the radial plates. (Summit unknown.)

Height 0.45 inch, breadth 0.54 inch; greatest breadth of radial pieces, 0.20 inch; breadth of pseudo-ambulacral areas, 0.04 inch.

This species will be readily distinguished from all the others yet known by 1861.]

its prominent horn-like interradial pieces, and its strongly carinated radial plates. These carinae are so prominent and regular, as to give the body the appearance of being divided into ten sharply angular ridges, or lobes, extending from near the summit to the base, the intervening depressions at the sutures, and those containing the pseudo-ambulacral fields being about equal.

*Locality and position.* Dry Fork, Brown Co., Ills. St. Louis Limestone.

*PENTREMITES MELO*, var. *PROJECTUS*.—This Pentremite agrees with *P. melo* of Owen and Shumard, excepting that its base is proportionally a little larger, and instead of being concave, projects so as to be distinctly visible in a side view. Its pseudo-ambulacral areas are also not continued down quite so near the base of the radial pieces as in *P. melo*. It may be a distinct species, but the difference seems to be scarcely of specific importance.

Both of these forms differ from the typical species of the genus *Pentremites*, in having each pair of ovarian openings distinctly separated, instead of closely united with merely a thin septum between. In this character, as well as in form, and the prolongation of the pseudo-ambulacral areas, they agree with the genus *Nucleocrinus* of Conrad, (= *Eleacrinus*, Rømer,) from which they differ in having the anal and oral openings distinct as in the true *Pentremites*. They constitute a sub-genus of *Pentremites*, occupying a position between the typical forms of that genus and *Nucleocrinus*.

*Locality and position.* Burlington, Iowa. Burlington Limestone. Collection of Mr. Charles Wachsmuth.

#### ASTERIDEA.

Genus *PETRASTER*, Billings, 1858.

*PETRASTER WILBERANUS*.—This beautiful star-fish resembles rather closely *Petraster rigidus* of Billings, (Decade III. Org. Rem. Canada, plate ix. fig. 3<sup>a</sup>,) but is smaller, and has more slender rays, with more angular spaces between. It also differs in having but two ranges of plates on each side of the ambulacral grooves, on the under side, instead of three. These pieces are about of the same size in each row, and sometimes appear to alternate; they are all rather prominent, and those of the outer range project a little laterally in the form of small nodes. Towards the outer extremities of the rays, however, the lateral ranges are contracted behind the others, so as to be scarcely visible from below. About 23 of these pieces may be counted on each side of the ambulacral furrow in each ray. The ambulacral furrows are very narrow, and indeed seem to be closed towards the extremities of the rays, by the gradual approximation of the inner rows of pieces on each side, which alternate and appear to fit together.

Our specimen only shows the under side, but along the outer margins of two of the rays, there is some appearance either of the overlapping of some of the dorsal parts by pressure, or of a slightly developed disk. This part does not seem to have any distinct range of marginal plates, but appears to be made up of small pieces, covered with granules, or bases of small spines.

We take pleasure in dedicating this interesting species to Prof. C. D. Wilber, of the Illinois State Normal School, to whom we are indebted for the use of the only specimen we have seen.

Greatest diameter about 1 inch; smaller diameter 0.33 inch.

*Locality and position.* Oswego, Kendall Co., Ill., in rocks of the age of the Trenton or Hudson River Group of the N. Y. series.

#### MOLLUSCA.

##### BRACHIOPODA.

Genus *PRODUCTUS*, Sowerby, 1812.

*PRODUCTUS MAGNUS*.—Shell large, semi-oval, or sub-hemispherical in outline;

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ventral valve gibbous, with a moderately shallow sinus, which usually becomes obsolete on the posterior part of the shell, before reaching the beak. Cardinal line scarcely as long as the entire width of the shell. Auriculate expansions moderately developed, and ornamented with a row of short spines, extending from the beak to the lateral angles, while there are indications of similar spines, scattered at irregular intervals upon the lateral borders and front of the shell. Dorsal valve concave, flat on the central and posterior portions of the shell, with a slightly rounded elevation, which corresponds to the sinus in the ventral valve. Surface of both valves ornamented with rather coarse rounded striæ, which increase by intercalation and bifurcation, and are about as wide as, or a little wider than, the spaces between them. These striæ are more tortuous and irregular upon the dorsal than on the ventral valve. Beak short, depressed, and extending but little beyond the cardinal border.

Length of an average sized specimen 3·75 inches, width 4·25 inches, height 1·50 inch.

This is the largest *Productus* known to us in the rocks of this country, and may be distinguished from the large varieties of *P. semireticulatus*, which it most nearly resembles, by its shorter and less elevated beak, as well as by the arrangement of the spines upon its surface, and by well marked internal differences which can only be explained by the aid of figures. It has heretofore been referred to the European *P. giganteus* (Martin,) but Mr. Thos. Davidson, to whom we sent specimens, has decided that it is not identical with that species.

*Locality and position.* Monroe County, Ill., and St. Genevieve County, Mo., in the Keokuk Limestone.

*SPIRIFERA GLABRA*, var. *CONTRACTA*.—Shell rather under medium size, quadrato-subcircular in outline, becoming moderately gibbous with age; length and breadth nearly equal, sides rounded; hinge short or scarcely equalling half the breadth of the valves near the middle. Dorsal valve much more compressed than the other, most convex along the middle from near the beak to the front, and sloping towards the sides; hinge margin truncated; beak very small, scarcely projecting beyond the hinge line, slightly incurved; area narrow. Dorsal valve gibbous, provided with a narrow, shallow sinus, commencing near the middle, and widening to the front, which is a little produced to fill a shallow sub-semicircular sinus in the anterior margin of the opposite valve; beak prominent, incurved, and rather pointed at the extremity; area very much contracted, triangular, more or less arched, and very obscurely defined; foramen rather large, or occupying near three-fourths of the small area, having nearly the form of an equilateral triangle, and apparently open to the beak. Surface nearly smooth, or only having obscure marks of growth, and sometimes showing, by the aid of a lens, faint traces of fine radiating striæ.

Length of largest specimen, 0·86 inch; breadth 0·90 inch; convexity 0·58 inch; length of hinge 0·45 inch.

This shell agrees so nearly with some varieties of *Spirifera glabra*, Martin, (sp.), that we have not been able to fully satisfy ourselves that it is specifically distinct, though we strongly suspect that it will prove to be so. In form it is almost exactly like Mr. Davidson's fig. 33, pl. 1\*, in his Monograph of the Carboniferous Brachiopoda of Scotland, representing a rather small specimen of Martin's species. It differs, however, from this, and all the varieties of *S. glabra* we have seen figured, in having a much smaller, and more obscurely defined ventral area. Indeed the sides of the beak of its ventral valve round in so regularly to the foramen, that it is often difficult to see where the margin of the area is. As this character is persistent in the five specimens of different ages that we have seen, we should not hesitate to con-  
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sider our shell distinct from *S. glabra*, were that species not known to be so extremely variable.

*Locality and position.* Chester and Pope Counties, Illinois. Chester Limestone of the Lower Carboniferous series.

### LAMELLIBRANCHIATA.

#### Genus CARDIOPSIS, M. & W.

(*Cardium* and  $\sigma\mu$ , from its resemblance to *Cardium*.)

Shell equivalve, somewhat inequilateral, very slightly oblique, ovate or cordiform, entirely closed; beaks rather elevated, distinctly incurved, and directed towards the anterior side; surface marked by radiating striæ or costæ; cardinal margin short, and rounding into the posterior border; hinge provided with one or two distinct anterior teeth in each valve, near the beaks. (Ligament and muscular impressions unknown.)

In first describing the species we regard as the type of this genus, we placed it provisionally in the genus *Cardiomorpha* of De Koninck, stating at the same time that we suspected it to be generically distinct.\* Prof. Hall has since described the same species from the same locality, in the Thirteenth Annual Report of the Regents of the University of New York, under the name of *Megambonia Lyoni*, and mentions the presence of two strong anterior teeth in the hinge of one valve. On clearing away the matrix from the hinge of one of our specimens, we have been able to see impressions of these teeth, the presence of which establishes, we think, the correctness of our suggestion, that it does not properly belong to the genus *Cardiomorpha*.

It is not improbable some of the species ranged by Prof. Koninck in his genus, (when all their characters can be made out,) may be found congeneric with our shell; though it is manifest those he considered the typical species are not, since he distinctly states that the hinge is without teeth, and provided with a smooth lamina from the beaks to the posterior extremity, as some of his figures show. In addition to this, all the species described by him, (with one single exception, which is a transverse shell, and apparently a wide departure from his typical species, as well as from ours,) are merely marked by concentric striæ, and show no traces of the regular radiating costæ seen on our shell.

Prof. Hall has described another species of this group, from near the same horizon, under the name of *Cardiomorpha ovata*, (non *C. ovata* DeOrbigny,) in the Iowa Report, vol. i. part ii. p. 522. The radiated surface and general appearance of these species give them somewhat the aspect of some species of *Ambonychia* of Hall. They differ, however, from that group, in having no posterior hinge teeth, and in being destitute of a hinge area, as well as in having a shorter, and less straightened hinge. They have scarcely any relations to Prof. Hall's genus *Megambonia*, which is founded on his *Pterinea? cardiformis*, of the Corniferous Limestone, and belonging apparently to a different family.

#### Genus LEDA, Schumacher, 1817.

*LEDA CURTA*.—Shell small, ovate, rather gibbous in the central and umbonal regions; anterior side abruptly rounded, the most prominent point being at the middle; base semi-ovate, more prominent in the antero-ventral region than behind; posterior side abruptly contracted, so as to become subangular at the extremity, beaks elevated, incurved, and nearly central; dorsal outline declining rather rapidly from the beaks, the anterior slope being convex, and the posterior slightly concave, posterior umbonal slopes prominently

\* *Cardiomorpha radiata*, M. & W., Proceed. Acad. Nat. Sci., Phila. Oct. 1860.

rounded, or subangular from the beaks to the narrow anal extremity. Surface ornamented by very regular, closely arranged concentric striae, about ten of which may be counted in 0·05 of an inch. (Hinge and interior unknown.)

*Locality and position.* Waterloo, Monroe Co., Ill. St. Louis Limestone.

### GASTEROPODA.

#### Genus DENTALIUM, Lin. 1740.

*DENTALIUM VENUSTUM.*—Shell very slender, and slightly tapering, nearly straight, rather thin; section circular, surface smooth.

Length, 0·80 inch; diameter of larger end, 0·09 inch; do. at smaller end, 0·03 inch.

It is probable where the surface of this shell is well preserved, very fine striae of growth could be seen by the aid of a lens, but in all of those we have examined, no traces of surface markings of any kind are visible. It seems to be allied to *D. antiquum*, of Goldfuss, (a Devonian species,) but is proportionally thinner, and has a smooth surface. From *D. priscum* of Munster, it differs in being much more slender and more gradually tapering. We have before us a few fragments of apparently the same species, but of larger size, from Spergen Hill, Ind., where they are associated with the small fossils described by Prof. Hall from that locality. Prof. H. has described in the Iowa Report, (p. 666,) a larger, more robust, and more curved species, from Warsaw, Ill., under the name of *D. primarium*, and gives the Warsaw Limestone as its geological horizon. This, however, is an error, the specimen described by Prof. Hall, belongs to one of us, (A. H. W.), and is from the Keokuk Limestone, near Warsaw, Illinois.

*Locality and position.* Waterloo, Monroe County, Ill. St. Louis Limestone.

#### Genus STRAPAROLLUS, Montfort, 1810.

*STRAPAROLLUS SIMILIS.*—Shell very small, sub-discoidal; spire much depressed, volutions four and a half to five, increasing rather gradually in size, horizontally flattened above from the suture to a moderately distinct revolving angle near the middle of the upper side, thence a little compressed on the upper outer slope, and rather narrowly rounder over the periphery; under side of last turn rounded, excepting in the middle, where there is an obtuse, but well defined revolving angle. Umbilicus (measuring across from its marginal angle on the middle of the body whorl,) once and a half the breadth of the last turn at the aperture, deep, and showing the inner side of all the whorls of the spire; suture well defined. Aperture subcircular, or a little modified by the succeeding turn, and the flattening on the upper side of the whorls; lip not oblique. Surface marked by rather obscure lines of growth.

Height (of a medium sized specimen) 0·18 inch; breadth, 0·31 inch; diameter of aperture, 0·08 inch.

This delicate little shell seems to be almost an exact miniature of our *S. planodorsatus*, excepting that its spire is a little more elevated, its periphery slightly less regularly rounded, and its umbilicus proportionally smaller. It appears to stand as it were intermediate between that species and our *S. umbilicatus*, being more elevated than the first and less than the last. It is certainly not the young of either of these forms, however, since the largest of our specimens never attain more than one-tenth the size of those shells, and yet have the same number of whorls.

We have before us specimens of a very closely allied form from Spergen Hill, Indiana, which agree exactly in size and form, excepting that the angles  
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of the whorls are less distinct, and the flattening of the upper side of the whorls is not quite so broad. These, we think, probably belong to the species under consideration, as they differ from any of those described by Prof. Hall from that locality, resembling them in other respects, in having a smaller umbilicus, more rapidly enlarging whorls, and a more elevated spire.

*Locality and position.* Waterloo, Monroe Co., Ills. St. Louis Limestone.

*STRAPAROLLUS SIMILIS*, var. *PLANUS*.—This form differs from the last in having its spire completely flattened so as to be upon a level with the last turn, and in having a slightly larger umbilicus; while the angle on the under side of the body whorl is a little farther out from the umbilical side. The flattened space on the upper side of its whorls also differs in sloping inwards instead of being horizontal; and its suture seems to be more distinct. Notwithstanding these differences, these forms agree so very nearly in size and other respects, that we do not feel quite warranted in regarding them as distinct species. Should it be thought necessary, however, to separate them specifically, the form under consideration can take as a specific name that by which we have designated it as a variety.

It is an interesting fact that these two forms taken together, present an exact miniature representation of the two varieties of *S. pentangulatus* (Sowerby's sp.) The fact, however, that the shells under consideration present all the appearance of mature growth, and never attain more than one-twentieth the size of *S. pentangulatus*, while they have only two or three whorls less, is, we think, sufficient reason for regarding them as distinct.

*Locality and position.* Same as last.

#### Genus ORTHONEMA, M. & W.

(*Etyim.*— $\sigma\theta\acute{o}\nu\epsilon\sigma$ , straight;  $\nu\eta\mu\alpha$ , thread.)

Shell elongate, many whorled; volutions ornamented with revolving carinæ, crossed by nearly straight lines of growth; body whorl not produced below; aperture angular above, slightly effuse below; peristome incomplete; lip simple, nearly straight; axis imperforate.

The shell upon which we propose to found this genus, has much the appearance of a *Murchisonia*, but differs in being entirely destitute of a spiral band, or a sinus in the lip as in that genus and *Pleurotomaria*, the lines of growth being distinctly seen crossing the carinæ, and the spaces between, without making the slightest curve. In first indicating the typical species of this genus, (*Eunema Salteri*, Proceed. Acad. Nat. Sci. Phila. Oct. 1860,) we referred it, with a query, to Mr. Salter's genus *Eunema*; later comparisons, however, have satisfied us that it cannot properly be placed in that group, since it does not possess the peculiar sigmoid lip characterizing the forms described by Mr. Salter. It also differs in having its whorls closely contiguous at all stages of growth; while its inner lip is less developed, and its columella is not provided with a ridge or angle as in the typical species of *Eunema*.

From the genus *Turritella*, some species of which our shell resembles in form and general appearance, it differs in its slightly effuse and less rounded aperture, disconnected peristome, and straight outer lip. It is probably more nearly allied to *Loxonema*, than to any of the groups we have mentioned, but presents the well marked difference of being provided with distinct revolving carinæ, and a straight, instead of a sigmoid outer lip. It will probably include several species of *Turritella*-like shells from the Coal Measures.

#### Genus LOXONEMA, Phillips, 1841.

*LOXONEMA MULTICOSTATA*.—Shell small, conical; spire moderately elevated; volutions about seven and a half, somewhat convex, increasing gradually in

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size; last one forming about one-third the entire length, rounded, not much produced below; suture well defined; aperture oval subrhombic, slightly effuse on the inner side below; outer lip thin, and nearly straight; inner lip a little reflexed. Surface ornamented by small, regular, straight, vertical folds or costæ, about equalling the spaces between, and numbering near thirty on the body whorl. Costæ obsolete on the under side of the last turn; no lines of growth visible under a lens.

Length, 0·36 inch; breadth, 0·15 inch; apical angle nearly regular, divergence about 28°.

*Locality and position.* Hodges Creek, Macoupin Co., Ill. Coal Measures.

### CEPHALOPODA.

#### Genus ORTHOCERAS, Breynius, 1732.

ORTHOCERAS ANNULO-COSTATUM.—Shell attaining a medium size, and having the form of an elongated, moderately compressed cone, the sides of which converge towards the apex at an angle of about 14°. Section elliptical, the greater transverse diameter being to the smaller, as 100 to 80. Surface ornamented with slightly oblique, annular costæ, which are less than the depressions between, and rather sharply elevated on the smaller half of the shell, but become gradually obsolete towards the aperture, where they are no more widely separated than near the smaller end. Traces of fine transverse striæ are also seen on well preserved specimens, both between and upon the costæ. (Septa and siphuncle unknown.)

The largest specimen we have seen is about five inches in length, (both extremities being incomplete,) and 1·83 inches in its greater diameter at the larger end, while the greater diameter at the smaller end is near 0·70 inch.

This species bears some resemblance to *O. dactylio-phorum* of De Koninck, (An. Fos. Ter. Carb. Belg. p. 518, Pl. XVII. fig. 1 A, and XVIII. fig. 7, a, b,) but differ in being more tapering and somewhat compressed instead of round.

*Locality and position.* Chester, Ill. Chester Limestone.

#### Genus NAUTILUS, Breynius, 1732.

##### Subgenus TREMATODISCUS, M. & W.

(τρήμα and δισκος,) in allusion to the perforated umbilicus, and the discoid form of the shell in the typical species.

We propose to range under the above subgeneric name, a peculiar group of *Nautili*, which differ so materially from the living typical species of *Nautilus*, that few Conchologists would place them even in the same genus, if they were found inhabiting our present seas. These shells are characterized by a discoid form and a wide shallow umbilicus, usually, if not always, perforated in the middle. Their whorls are slender, very slightly embracing or merely in contact, and provided with revolving angles and grooves, while the surface is frequently ornamented with revolving striæ. The siphuncle is central, or located between the middle and the dorsal side, though never quite marginal.

In first publishing descriptions of some of the forms included in this subgenus, we proposed to retain for it Prof. King's abandoned name, *Discus*. As this name had, however, been previously used by Fitzinger (in 1833) for a group of *Helicidæ*, and by Prof. Haldeman (in 1840) for a group of *Limnæidæ*, it becomes necessary to introduce a new name for the group under consideration.

Although in some respects analogous to *Discites* of McCoy, these shells differ [1861.]

from the typical forms of that group, in having a perforated umbilicus; while their whorls are less compressed laterally, more slender, and provided with several distinct revolving angles and grooves. They also differ in being often ornamented with well defined longitudinal lines.

This group appears to be mainly, if not exclusively, confined to the Carboniferous system, and will include in addition to our *N. digonus* and *N. trisulcatus*, the following foreign species: *Nautilus stigalis*, *N. Edwardsianus*, and *N. Omalianus* of Koninck, together with *N. sulcatus*, *N. pinguis* and *N. cariniformis* of Sowerby.

We believe all such fossil shells will some time be separated entirely from the genus *Nautilus*.

NOTE.—Our recent investigations enable us to make the following corrections in regard to a few of the fossils described in our papers of September and October, 1860:

1. *Cyathocrinus scitulus* (Sept. 1860). In comparing this species with those described by Prof. Hall, in the supplement to the Iowa Report, we overlooked its probable identity with his *C. sculptilus*. The fact that he had described the first anal plate of *C. sculptilus* as being "nearly as large as the subradials [and] heptagonal" in form, led us to regard our crinoid as a distinct species, and it was not until our description was in print, that a more careful examination of his diagram on page 60, satisfied us that he had inadvertently described one of the subradial plates as the first anal piece. When this correction is made in his description, it agrees so nearly with our crinoid, that we have scarcely a doubt in regard to its identity with his species; and as his name was first published, it will have to take precedence.

2. *Platystoma nana*, (Oct. 1860). Better specimens show this to be a true *Naticopsis*.

3. *Eulina peracuta*, (Oct. 1860), should be ranged under *Polyphemopsis*, of Portlock, probably a section of the genus *Lozonema*.

4. *Orthoceras expansum*, (Oct. 1860), belongs to the genus or subgenus *Actinoceras*.

5. *Cyrtoceras curtum*, (Oct. 1860), should be ranged under the subgenus *Aploceras*.

#### Descriptions of New Fossil Mollusca, from the Cretaceous Formation at Haddonfield, New Jersey.

BY ISAAC LEA.

In December, 1858, I published, in connection with Prof. Leidy and W. Parker Foulke, Esq., in the Proceedings of the Academy, some account of the *Green Sand Formation* at Haddonfield, New Jersey. I then gave reasons for believing that this interesting and extensive deposit—which my late learned friend, Professor Vanuxem, was the first to place on its true horizon, in relation to the well known Cretaceous deposits of Europe—might be the analogue of the "*Etage Cenomanien*" of D'Orbigny. The object being, then, simply to make out some of its relations, its extent so far as known, and its true position in relation to our *Cretaceous Formation*, I gave only a list of genera of the *Mollusca*, found by Mr. Foulke and myself. I now give a complete list of all the species we then discovered, and I add descriptions of the few species which had not heretofore been observed. It will at once be recognized by those who have studied the Cretaceous masses of the United States, that there is a very strong similarity, if not identity, of this deposit at Haddonfield, with that of the "*Ripley Group*" in Mississippi, from which Mr. Conrad and Mr. Gabb have

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described and illustrated many species in the Journal of the Academy in 1858 and 1860. It may also be observed, by reference to the valuable memoir published by Prof. Hall and Mr. Meek in the Memoirs of the American Academy of Arts and Sciences, June, 1854, that the same geological masses exist in Nebraska, some of the species being identical. A fine suite of specimens of these having been sent to the Academy by the kindness of that energetic naturalist Dr. Spillman, the comparison may be easily made.

*CORBULA FOULKEI*.—Testâ lævi, triangulari, inflatâ, posticè acutè angulatâ, anticè obliquè rotundatâ, æquilaterali. infernè paulisper striatâ; valvulis crassiusculis; natibus prominentibus, æminatis, incurvatis, ferè mediis.

Cabinet of the Academy of Natural Sciences.

Length .22, breadth .33 of an inch.

*Remarks*.—A single specimen only of this species was found at Haddonfield. It was accompanied by two other species described by Mr. Gabb, viz.: *C. subcompressa*, from Tennessee, and *C. crassiplicata*, on the Mississippi and Tennessee State line.\* It is very distinct from the latter, but is closely allied to the former. It may, however, at once be distinguished from it by the posterior angle being more acute, and in having the basal margin less rounded. I have great pleasure in naming this species after our fellow member, W. Parker Foulke, Esq., who so liberally and intelligently opened this locality of Green Sand Formation with the view of making discoveries in these deposits of fossil bones, &c., in which he was so eminently successful, as I have formerly stated, (Proc. Acad. Nat. Sci. 1858, p. 218.)

*MODIOLA JULIE*.—Testâ transversè striatâ, subrhomboideâ, subinflatâ, posticè obliquè truncatâ, infernè emarginatâ; valvulis fragillissimis; natibus prominulis, ferè terminalibus.

My Cabinet and Cabinet of the Academy of Natural Sciences.

Length .23, breadth .36 of an inch.

*Remarks*.—A single specimen only was found, and this consisted of an imperfect left valve. Being exceedingly thin and friable, it is impossible to remove it from the matrix of clay, where it exhibits only the interior, showing, however, the transverse striae of the exterior. Römer, in his "Kreide von Texas," describes three species, but this species I believe is the first which has been found in our Green Sand masses of New Jersey. Mr. Gabb has described a species (*ovata*) from the Yellow Limestone of Timber Creek, N. Jersey, and one (*Saffordi*) from the Ripley Group, in Tennessee, (Jour. Acad. Nat. Sci. v. iv., n. s., p. 395). The species above described is nearest to *Saffordi*, being nearly of the same size, but the outline is quite different, *Julie* being subrhomboidal, and *Saffordi* being gibbous. I name this species in honor of Mrs. W. Parker Foulke, who took great interest, with her husband, in the development of this interesting locality near to their country residence.

*DOSINIA HADDONFIELDENSIS*.—Testâ subrotundâ, lentiformi, compressâ, subæquilaterali, exæquissimè concentricè striatâ; valvulis tenuibus; natibus prominentibus, acuminatis, ferè mediis.

My Cabinet and Cabinet of the Academy of Natural Sciences.

Length .40, breadth .46 of an inch.

*Remarks*.—Two imperfect specimens were obtained. Both with the two valves, but neither perfect. The close, minute, impressed, concentric lines are well preserved, but like all the mollusca found at this locality, the valves are much fractured, while the juxtaposition of the pairs are maintained. It is nearly of the same outline of *D. depressa*, Con., from Eufaula, Alabama, but is more angular above and is not so large.

\* Jour. Acad. Nat. Sci., new series, v. iv., p. 394.

*List of Green Sand Fossils found at Haddonfield, N. J., by Mr. Foulke and Mr. Lea.*

## ACEPHALA.

Arca Eufaulensis, *Gabb.*  
 Arca Saffordi, *Gabb.*  
 Astarte crenulirata, *Con.*  
 Astarte octolirata, *Gabb.*  
 Anomia tellinoides? *Mort.*  
 Anomia argentaria, *Mort.*  
 Cardium multiradiatum, *Gabb.*  
 Cardium Eufaulense, *Con.*  
 Cardita subquadrata, *Gabb.*  
 Corbula subcompressa, *Gabb.*  
 Corbula crassiplicata, *Gabb.*  
 Corbula Foulkei, *Lea.*  
 Crassatella lintea, *Con.*  
 Ctenoides crenulicosta, *Ræmer.*  
 Dosinia depressa, *Con.*  
 Dosinia Haddonfieldensis, *Lea.*  
 Dentalium Eufaulensis, *Gabb.*  
 Exogyra costata, *Say.*  
 Gervilia ensiformis, *Con.*  
 Inoceramus involutus, *Sow.\**  
 Leda protexta, *Gabb.*  
 Leda longifrons, *Con.*  
 Liuarina metastrata, *Con.*  
 Legumen appressus, *Con.*

Legumen ellipticus, *Con.*  
 Modiola Juliae, *Lea.*  
 Nucula percassa, *Con.*  
 Ostrea denticulifera, *Con.*  
 Ostrea larva, *Lam.* = falcata, *Mort.*  
 Ostrea plumosa, *Mort.*  
 Ostrea tecticosta, *Gabb.*  
 Pecten simplicius, *Con.*  
 Pinna laqueata, *Con.*  
 Siliquaria biplicata, *Con.*  
 Tellina (Tellinimera) eborea, *Con.*  
 Trigonina Eufaulensis, *Gabb.*

## GASTEROPODA.

Lunatia paludiformis.  
 Turbonilla laqueata, *Con.*  
 Turritella vertebroides, *Mort.*  
 Turritella Hardemaneusis, *Gabb.*

## CEPHALOPODA.

Ammonites placenta, *De Kay.*  
 Scaphites iris, *Con.* = Conradi, *Mort.*

## ECHINODERMATA.

Cidares armigera, *Mort.*

*Coprolite.*—In this small coprolite is the tooth of a ganoid fish, probably of the genus *Enchodus*.

The Academy proceeded to an election to fill the vacancy in the Committee on Conchology, caused by the resignation of Dr. C. J. Cleburne; and Mr. Geo. W. Tryon was chosen.

The death of Mr. Geo. M. Keim, a member of the Academy, was announced.

July 2d.

Mr. LEA, President, in the Chair.

Twenty-one members present.

Dr. Le Conte presented the following communication from Baron Osten Sacken, on the sex of *Cynipidæ*:

One of the most puzzling questions in Entomology is the total absence of the male sex in some genera of *Cynipidæ*. Of the numerous species of the genus *Cynips* proper, the females alone are known. Hartig, the monographist of this family, has had the patience to collect about 28,000 galls of *Cynips divisa*, to rear the flies from them and to examine, one by one, the 9 or 10,000 flies

\* Min. Conch. Tab. 412. The figure by Hall in Fremont's Report, p. 309, seems to be the same with this from Haddonfield. Mr. Hall supposes the specimen which came from East of the Rocky Mountains, 105° long. 39° lat., to be the same with Sowerby's from the Upper Chalk at Lewes, England.

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obtained in this way. All proved to be females. Similar investigations, which he undertook with several thousands of specimens of different other species, led to the same result. This total absence of one sex in the genera *Cynips*, *Neurosterus*, *Apophyllus* Hartig, appeared the more strange and unaccountable, as in the closely allied genera *Teras*, *Andricus*, *Trigonaspis*, *Spathegaster*, males and females occurred in almost equal numbers. The supposition that the males had escaped the investigations of entomologists seemed inadmissible in the case of insects obtained mostly from rearing and not by means of catching. This, combined with the circumstance that the presence or absence of the males occurred constantly through whole genera and not merely in single species, seemed to favor the belief that in some genera the males did not exist at all.

More than one hypothesis has been proposed for the solution of this anomaly. Hartig, after having studied the anatomy of some Cynipidæ, imagined that he had discovered their being androgynous. Soon, however, he gave up this conclusion and confessed his error. Erichson proposed another solution. Those who have reared gall flies know that very frequently galls of the same kind produce *Cynipidæ* of two different forms, one of them being the true gall-producing *Cynips*, (subfamily *Psenides* Hartig,) the other having been hitherto considered as a parasite, (subfamily *Inquiline*.) The latter occur in male and female specimens. Erichson suggested, not as a result of actual observation, but as a mere idea for future investigation, that the two forms, reared from the same gall, however different in their characters, might be the same species; that the male *inquiline* were in reality the males of *Cynips*, and that their females had to be considered as a *second form* of the gall-producing female *Cynips*. He reminded that this would not be the only instance, among insects, of the occurrence of *two forms* of females, the same being the case with some butterflies and some *Dytisci*.

The hypothesis of a parthenogenesis among the *Cynipidæ* has also been resorted to, and Siebold discusses it in the latter part of his well-known pamphlet.

If I have dwelt at some length on all these hypotheses, it was in order to show the importance which is attached to this question and the degree of its apparent inextricability, which has compelled men of science to have recourse to such improbable and far-fetched explanations.

Engaged since last autumn in the study of galls and gall-flies, I have happened quite recently to make an observation which would lead to a more simple solution of the vexed question.

I discovered on the leaf of the red oak a very curious, elongated-fusiform, petiolate, pale green gall, about an inch long, and, in its stoutest part, but a little more than one-tenth of an inch broad. Having been lucky enough to rear the insect from it, I was struck by its resemblance with *Cynips confluens* Harris, the originator of the large, globular gall of the red oak, commonly called *oak apple*. The specimen being a male, and the specimens of *C. confluenta* which I have seen being all females, it struck me immediately that this was the solution of the mystery. Male and female occur in galls of two altogether different forms!

If it is so, one might object, how does it happen that this observation has never been made before? Why did the German entomologists, having reared so many, (I believe more than 150 gall-flies), never come across it? The explanation may be this: Generally the distinguishing characters of the species of this family are so slight, that it would have been difficult to assign a certain male to a certain female without having reared them from the same gall. Entomologists may have reared males from one gall and their females from another, without suspecting their identity. If I succeed better, it was merely because I happened to make my observation on a species with very striking characters, which were therefore easy to identify although the specimens were

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obtained from another gall and differed, as males usually do, in size and color from the females.

Another, perhaps more serious objection, may be made. If the males of the genera, hitherto thought agamous, exist, how does it happen that Hartig, with the abundant material in his possession, did not have a single one of them; it seems that if he had had but *one*, he would not have pronounced those genera agamous. To this I answer that he may have possessed males of this description, but have located them in other genera. Hartig's classification, in his paper on *Cynipidæ*, is a mere outline, as he intended to publish some time a more detailed monograph. This not having been done, the definitions of his genera, as they stand now, are altogether insufficient, and in most cases I have been unable to make them out. Still I can easily conceive that he might have placed the female of *C. confluens* in one genus, and what I take to be its male in another.

However, be it as it may, the only material point in the present case is to know whether the male which I reared from the spindle-shaped gall is specifically identical with the females obtained from the common oak-apple.

My belief of their identity is based upon their exact similitude in everything except those characters which usually distinguish the males from the females, (as size, color, length and number of joints of the antennæ). This similitude alone would perhaps not be conclusive, if the characters of the species, as already remarked, were not rather uncommon and sufficiently striking to facilitate its immediate recognition. The thorax is deeply cribose, two longitudinal, parallel, somewhat indistinct carinæ begin at the collare, and stop before the middle of the thorax; two other carinæ converge towards the scutellum; the scutellum is also deeply sculptured and has two foveæ at the basis; the wings are conspicuous by a brown spot near the areolet and by some peculiarities of the venation; the subcostal, for instance, becomes obsolete just before reaching the anterior margin, the veins surrounding the areolet have a peculiar shape, etc. All of which are exactly reproduced in the male and female specimens in question. The male has 15, the female 13-jointed antennæ; the former is smaller, more slender and much darker in color than the latter.

The supposition of the identity of these insects is finally strengthened by their galls occurring on the same tree, the red oak, having been found in the same localities, and the perfect insect being hatched at the same season.

A glance at the specimens would, I have no doubt, convince any entomologist, conversant with the *Cynipidæ*, of their specific identity. Not being able, however, to convey a demonstration of the same force by means of a mere description, and being sufficiently aware that a fact so novel and so extraordinary as the production, by the sting of the same insect, of two altogether different forms of galls, according to the sex of the egg or of the future larva, cannot be admitted in science without further inquiry, I offer the above statement as a mere suggestion for future research.

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July 9th.

Vice President VAUX in the Chair.

Twelve members present.

The following papers were presented for publication:

"Descriptions of certain species of Diurnal Lepidoptera, found within the limits of the United States and of British America," by Wm. H. Edwards.

"On *Cyprinus corporalis*, Mitchell, referring it to the genus *Semotilus*, Rafinesque," by Charles C. Abbott.

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July 23d.

Vice-President BRIDGES in the Chair.

Nineteen members present.

The following papers were presented for publication :

"Description of a new species of *Pitta* (*Brachyurus*) *leucoptera*,"  
by D. G. Elliot.

"A Monograph of the Tringæ of North America," by Elliott Coues.

"Notes on some genera of Fishes of the western coast of North America," by Theodore Gill.

"On a new type of Aulostomatoids found in Washington Territory,"  
by Theodore Gill.

"Descriptions of new Pteropine Bats from Africa," by Harrison Allen, M. D.

Dr. Slack called the attention of the Academy to a species of the family of Lemuridæ, obtained by Mr. P. B. Duhaillu in equatorial Africa, and named by him *Otolienus apicalis*, (Proc. Boston Soc. 1860.) The species was first described by the late Maj. Le Conte, in the Proceedings of the Academy, 1857, under the name of *Microcebus elegantulus*. Neither of these names are proper. From the genus *Microcebus* it is readily distinguished by the form of the head and the position of the inferior incisors, which in the specimen under consideration are horizontal. The genus *Otolienus* was founded by Illiger, in his *Prodromus*, 1812, upon a wrong basis, viz., the absence of ears. The ears of this genus are very thin, and are frequently broken in transportation; this is the case with the present specimen, though on its arrival at the Academy a few years since they were perfect, and are described by Maj. Le Conte as large and membranous. The proper name of the genus is *Galago*, given it by St. Hilaire, in his "Mémoire sur les rapports naturels des Makis," 1795. Maj. Le Conte's specific name, by the rule of priority, must be retained, and the proper name of the species is therefore *Galago elegantulus*. Two young specimens of the same species, obtained by Dr. Ford in the Gaboon country some years since, were exhibited; they vary somewhat from the adult in coloration, but can readily be distinguished by the tip of the tail being white, a character belonging to no other species of the genus.

July 30th.

Vice-President BRIDGES in the Chair.

Twelve members present.

On report of the respective Committees, the following papers were ordered to be published in the Proceedings :

Description of a New Species of the Genus *PITTA*.

BY D. G. ELLIOT.

*PITTA* (*BRACHYURUS*) *LEUCOPTERA*, Elliot.

Viridis; capite nigro castaneo maculato; gula alba; corpore subtus fulvo, crisso dilute coccineo; tectricibus alarum albis; uropygio viridi-cyaneo, remigibus nigris magna ex parte albis; cauda nigra apice caerulecente. Rostro nigro apice brunneo; pedibus pallescentibus. Juv.

*Habitat*.—Ceylon.

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Young. Green. Head, back of neck and chin black, the first spotted with chestnut, front chestnut. Throat white; upper part of breast brown, lower parts paler brown; crissum very light scarlet; wings green, shoulders covered with large white spots, forming a broad band; primaries black; rump greenish blue, tail black, bordered with blue. Bill black, end horn color; feet light flesh color.

Of this species I have only a young bird from which to take my description, but it differs so greatly from the young of any species of this family, or even from any adult which I have had an opportunity of examining, that I have determined to give it a name, trusting that some future ornithologist, more fortunate than myself, may be successful in discovering the adult. The great peculiarity of this species is its white shoulders, which is a characteristic I have never before witnessed among the Pittidæ, that portion of the plumage in these birds being almost invariably of different shades of blue; and as in the majority of the species of this family, the young bear the plumage of the adult from the period of leaving the nest, I feel assured that the adult of *P. leucoptera* would have a conspicuous white wing.

The first primary is all black, the 2d, 3d and 4th have more or less white on the lower half of both webs, while the 5th, 6th, 7th, 8th and 9th are all white, with the exception of the tips, which are black.

I obtained my specimen from M. Parsaduki, of Paris, and upon the label is only the word *Ceylon*, which I suppose is its native country.

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**On *CYPRINUS CORPORALIS* Mitch., referring it to the genus *SEMOTILUS*  
Rafinesque.**

BY CHARLES C. ABBOTT.

In the Delaware River, and in certain of its contiguous streams, there exists a large and unusually brightly tinted Cyprinoid, that bears many and strong resemblances to the *Leucosomus pulchellus*. Upon a more careful observation, however, it becomes evident, from the want of barbels and the variance of the pharyngeal teeth and bones, that the species is generically distinct.

Dr. S. L. Mitchell first made known to ichthyologists the species under consideration, giving to it the name *Cyprinus corporal*, and stated it to inhabit "the Hudson in the neighborhood of Albany, the Walkill through its whole extent, and the western streams and lakes from Wood Creek to the Oneida Lake, and so on."

Dr. J. E. DeKay, in his work on the Fishes of New York, quotes the description of Mitchell, referring the species to the heterogeneous mass he entitled *Leuciscus*; stating at the termination of the quotation, "it has not yet been my good fortune to meet with (this species)."

Dr. Storer, in his "Synopsis of the Fishes of North America," quotes the description of Mitchell, and the quotation of DeKay—, placing both, with queries, as synonyms of *Leuciscus* (*Leucosomus*) *pulchellus*, Storer.

Messrs. Baird, Girard, Agassiz and Kirtland make no mention of the species, from a want of specimens evidently, as the description of Mitchell, though meagre in the extreme, mentions certain peculiarities by which the species would be instantly recognized, should bona fide specimens be exhibited.

The author is indebted to his friend J. Walter Vroom, of Trenton, N. J., for specimens of the species and the remarks upon its habits, quoted in this paper.

*SEMOTILUS CORPORALIS*, Abb.

Syn. *Cyprinus corporal*, Mitch., Amer. Mon. Mag. vol. 2, p. 324.

*Leuciscus* ? *corporalis*, DeKay, Fishes of New York, p. 213.

*Leuciscus pulchellus* ? Storer, Synop. Fishes of N. Amer. p.

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Head constitutes one-fourth of total length, exclusive of the caudal. Cheeks and opercula flattened as far forwards as the angle of the jaws. Snout bluntly rounded. Facial and dorsal outlines continuous, the former describing a more decided curve from a point opposite the anterior nostril. Mouth medium; cleft of jaws oblique. Maxillary bone extending to the anterior margin of the eye. Angle of lips somewhat nearer the termination of the maxillary bone than extremity of snout. Eye large, circular, prominent; the diameter of the orbit contained six (6) times in the length of the side of the head. The lower margin of the orbit is on a line drawn from the edge of the upper lip, *when not protracted*. Nostrils adjoining; the anterior superior in position, inferior in size; both situated in an elongated oval depression, extending from the orbit to midway between orbit and extremity of snout.

Body compressed, tapering to the tail, with the dorsal and ventral outlines describing gentle and similar curves. Greatest depth of body is at a point midway between occiput and anterior insertion of the dorsal, and is one-tenth greater than the length of the head. Longitudinally and transversely the diameters of the scales are nearly equal; but the free portion of the scales upon the sides exhibits a depth double the length; upon the back the disproportion is less, and still more so on the occipital region. Forty-five scales compose the lateral line, which line describes a profound curve from its origin to a point opposite the extremity of the pectoral fin; during the continuation of its extent it is perfectly straight, and midway between the dorsal and ventral outlines.

Dorsal fin small, quadrangular, the height one-third greater than the width at the base; the insertion of the anterior ray exactly midway between the extremity of snout and insertion of caudal. Ventrals small at their insertions; the free margin of triple width. Pectorals large; when closed slender, falciform and pointed; the third and longest ray nearly four times the length of the basic extent of the fin; when expanded, the fin describes an uninterrupted curvature five times greater in extent than the base. Anal quadrangular, with the anterior ray one-third longer than the base. Caudal furco-lunate, with the distance between the tips equal to the length of the head.

D, 1—8. P, 16. V, 8. A, 8. C, 20 —  
2

*Coloration.* Occiput, forehead and upper jaw, deep olive green. Cheeks and opercula bright vermillion, with metallic lustre. Eye lemon yellow, the pupil being immediately surrounded with a narrow line of glistening golden. Lower jaw white, the lip margined with vermillion. At the commencement of squamation, from the insertion of one pectoral to the other, is a band of olive-green, nearly the width of the scales.

Back light, lustrous, steel-blue, with the base of the free margin of each scale with a narrow line of olive green. Three rows of scales above and two below the lateral line, bright lustrous pink, with the lines of olive on the scales decreasing in width on the two rows beneath the lateral line, and wanting on the scales of the belly, which are bright silvery.

Dorsal fin vermillion on the basal half, the terminal half crossed by three bands of green and vermillion, the centre being of the latter color. Pectorals vermillion, with a broad terminal band of dusky green. Ventrals and anal dusky. Caudal yellowish, with a terminal dusky band.

Total length of largest specimen procured,  $15\frac{1}{2}$  inches.

No variation in the coloration of the sex, except a more subdued tinting in the female.

With the exception of the formula of fin-rays, the description is in full accordance with the above, and as it cannot be applied to any other than the above described fish, it may safely be assumed the fish in question and the species described by Dr. Mitchell are one and the same.

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The remarks quoted below also coincide with the statement of Mitchell—"takes the hook, if baited with dough, when let down through holes in the ice, at mid-winter."

"This fish, so far as I am acquainted with it, frequents swift, clear and deep water, often rising to the surface to catch grasshoppers, toads that have fallen in the water, &c. This fish takes the bait more vigorously in cold than warmer weather. The young are found, during the latter part of summer, in very shallow water, generally frequenting stony banks; at this time they are exceedingly shy, and refuse a sinking bait, but would probably take the fly of the trout-fisher. This fish is more numerous in the contiguous streams than in the Delaware."—*J. Walter Vroom.*

#### Note on HYPOGNATHUS NITIDUS, Gir.

This species proves very abundant in many of the streams in the neighborhood of Trenton, N. J. It in no manner differs from specimens taken from Lake Champlain, the original locality. We suspect this to be the southernmost extent of its geographical distribution, as the author has seen undoubted specimens of *H. regius*, Gir., taken in the Delaware, nineteen miles below Trenton.

It is generally found associated with *Semotilus atromaculatus* and *Lucilus Americanus*, though it sometimes appears to be the sole representative of the Cyprinoids in many streams of considerable extent, as indeed do both of the other mentioned species. Its preference is decidedly for rapid water, as far as we have observed, which is the case with the former, but not with the latter of the two above-mentioned species.

#### Descriptions of new PTEROPINE BATS from Africa.

BY HARRISON ALLEN, M. D.

**HYPSIGNATHUS**, n. g.—Head large, massive. Face greatly developed, anterior portion humped. Nose very high, blunt, corrugated. Nostrils produced: opening laterally; bounded internally and inferiorly by a projection of the eoriaceous membrane, which by its continuation externally forms a lateral fold. This expansion, after descending from the posterior part of the nostril to the lip, runs along the line of the upper jaw, forming the outer wall of a distinct groove, the inner wall of which is made by the true lip. Just as this remarkable membrane turns down from the anterior nares, it also extends forward, clearly defining the boundaries of the snout. From the lower anterior part of each nostril a leathery ridge extends to the mouth. These divide the muzzle into three distinct sulci. The chin is peltated, and indistinctly divided into halves by a mesial line. Ears small, naked, without tragus and tufted at base. Wings thrown very far back. Basal joint of thumb small. Index finger clawed. Interfemoral membrane small, ecaudate. Lower incisors closing anterior to the upper.

Dental Formula,  $m \frac{3}{5}, c \frac{1}{1}, i \frac{4}{4}, c \frac{1}{1}, m \frac{3}{5} = 28.$

**Skull** remarkably high. Nose broad at summit, occasioned by the development of the nasal bones. Extending from the canines to near the top of the face is an irregular ridge for the insertion of the curious nasal membrane already noticed. The infra-orbital foramen opens posteriorly to the entire dental series. The skull is broader between the eyes than in other Pteropines. Post-orbital processes stout, short and pointed outwards and backwards. Cranium small, comprising but a third of the entire head. A parietal crest is present for about two-thirds its length, when it abruptly terminates at the apex of a small triangle which is formed by the want of approximation of the hinder

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portion of the temporal fossæ. Occipital ridge well marked and leaning backwards. Foramen magnum orbicular. Palatal bones united with the deeply arched mouth by a greater angle than that of *Pteropus*. The foramen incisivum is cordate.

The lower jaw is flattened and irregular, depressed at symphysis. The two halves unite at a less acute angle than in *Pteropus*. The coronoid process is low, and the angle which it forms with the alveolar ridge is so slight that the distance from the top of the process to the last molar is equal to one half the distance from the same point to the small pre-molar. The condyloid process is about one-half the distance between the base of the jaw and the top of the coronoid.

The superior incisors are small unicuspid, regular and separated from one another. The distance between the canines and the laterals is greater than the distance from one incisor to another. The canines are slender, convex anteriorly, point slightly backward, and, when the jaws are closed, nearly touch the plane on which the skull rests. The first molar is pointed; the second and third are much alike, the posterior being smaller and less trenchant, the external cusp being the larger.

The inferior incisors are small, separated, the space between the centrals exceeding that between the laterals. The canines are smaller and blunter than those above, and lean strongly backwards. The premolar, which is absent above, is here present; it is very minute, shaped, like an incisor, is nearer the canine than the second molar, is directed backward and outward, and, when the jaws are closed, is observed to be placed anterior to the superior cuspidatus. The first and second molars assume the carnivorous type; the second has two cusps divided as usual by a longitudinal groove; the third and fourth have their cusps much worn, the latter being little more than flattened tubercles.

As mentioned above, the articulation is curious; the inferior incisors close in front of the superior, so as to completely hide them.

H. MONSTROSUS, n. s.—Fur fine and short, very thin upon the face, interspersed with a few long stiff hairs. A well-marked white line extends from the facial protuberance to between the eyes. Top of head and nuclear region light ash brown, dark in the centre, lighter upon the sides, and narrowing to a whitish band which encompasses the inferior part of the anterior surface of the neck. The hair between this band and the chin is very thin and scattering, and of a pale brown. Dorsum delicate plumbeous tipped with grey, thicker above than below. The fur runs to a purer brown upon the posterior part of interfemoral membranes and thighs. The fore extremities to near the carpal joint are clothed with a thin coating of fur, while the interbrachial surface and that contained between the fourth finger and the sides of the body are studded in different directions with interrupted lines of minute hairs. The pectoral region and sides of belly of the prevailing hue—plumbeous grey—with a tendency of that in the centre of the abdomen to become whitish. Pubic region brownish. At the point of junction of the interbrachial membrane with the body a row of white hair is seen. The membranes beneath have upon them the same thin lightish hairs as above, but more extensive.

The dimensions of the skull are as follows :

Length from occiput to extremity of nose.....	2.9 in.
“ of cranium.....	1.0
“ “ nose.....	1.6
Height of nose.....	0.9
Breadth of nasal bones.....	0.3½
“ palate between canines.....	0.6
“ “ “ molars.....	0.9
Distance between zygomas.....	1.6

Length of lower jaw.....	2.3 in.
Breadth of symphysis.....	0.6
Distance between condyles.....	1.3
Height of coronoids.....	0.9
Distance between first premolar and canine.....	0.2
Dimensions of the body :	
From snout to interfemoral membrane.....	12.0
"    "    ears.....	3.4
"    "    eyes.....	2.0
"    anterior part of eyes to ears.....	1.4
Length of mouth.....	1.4
Breadth of snout.....	1.4
Height of snout.....	0.8
"    face.....	1.1
Breadth of chin.....	0.9
Length    "    .....	0.4½
Breadth between eyes.....	1.3
"    "    ears.....	1.6
Distance from snout to wing membrane.....	5.7
Length of ulna.....	4.6
"    thumb.....	2.0
"    first joint.....	0.9
"    second joint.....	1.3
"    index finger.....	3.9
"    third    "    .....	9.6
"    fourth    "    .....	7.1
"    fifth    "    .....	6.6
"    inferior extremity.....	3.6
"    tibia.....	2.1
"    foot and claws.....	1.3
Expanse of wing membranes.....	27.0

*Hab.*—Western Africa. Discovered by M. Duchailu.

*EROMOPHORUS COMPTUS*, n. s.—Hair soft; thick above, thinner below. Color on the back a delicate reddish fawn, becoming darker on the loins and base of arms. Under surface with a large ovoid patch of dirty white, bounded laterally by longitudinal fawn colored stripes. Face covered with short brown hairs. Small yellow tufts at base of ears. Chin whitish. Epaulettes faintly marked. Lips moderate.

3 1 2 1 3

Dental formula, m —, c —, i —, c —, m — = 26.

5 1 4 1 5

The fur of this bat differs from that of any other of the genus to which it belongs in not being unicolored. That upon the back of the neck and shoulders possesses three well-defined hues—the base is of a dark brown, the middle of a paler hue, while the tip forms a delicate reddish brown. This, however, can only be seen where the hair is thickest. Lower down upon the back and on the belly the entire length of each individual hair is of one color. Everywhere the hair covering is soft and yielding. All that space beginning between the eyes and terminating at the middle of the back is of thick, fine, beautiful hair. The sides are much thinner and darker; they form a continuous line with that of the ulna, where it extends down upon the wing membrane some little distance. The continuation of the dorsal fur forms on the ventral surface of the interfemoral membrane a sparsely furnished patch, which goes to make the lower portion of the lateral fawn-colored bands. These latter are narrow inferiorly, wider superiorly, where they terminate gradually in the lighter hue of the cervical region. From the external side a prolongation is sent up along the line of the humerus and ulna to within an inch of the carpal joint; both

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above and below this line the membrane has upon it several points of short lanuginous hairs of a whitish color.

The customary clumps of hair at the base of the ears are present. The anterior spot is larger than the posterior.

The characteristic shoulder tufts are by no means conspicuous; they are composed of thin long hairs of a light color. The centres are quite naked and placed more upon the neck than is usual.

The skull is smaller than that of *E. gambianus* Ogil. The post-orbital processes are small but well defined; temporal fossæ not approximate. The intermaxillaries slight, terminating in a point, not abruptly, as in *E. gambianus*, and supports but two incisors. The latter occupy the centre of the inter-canine space, and are slightly separated from one another.\*

The other teeth differ in no particular from those of *E. gambianus* except in their mode of articulation, in which the inferior incisors close in front to the superior, as already seen in *Hypsognathus*, the superior teeth, however, are not entirely hidden.

This species holds a position between *E. gambianus* Ogil. and *E. shoensis* Rüp. It differs from the former in the relative length of the nose, in the tricolored hair of back, and in the greater extent of the epigastric patch; from the latter in being much larger, and in the absence of the dark colored abdomen.

*Dimensions.*

Length of head and body.....	6.0
“ from snout to base of ears.....	1.6
“ “ eye to snout.....	0.8
“ “ anterior part of eye to ear.....	0.8
Height of ears.....	0.9
Breadth of ears.....	0.6
Length from nose to wing membrane.....	2.8
“ of forearm.....	3.0
“ longest finger.....	6.0
“ fourth “.....	4.8
“ thumb and claws.....	1.2
“ basal joint.....	0.3
“ second joint.....	0.8
“ tibia.....	1.6
“ foot and claws.....	0.8
Expanse of wing membrane.....	18.0

*Hab.*—Western Africa; discovered by M. DuChaillu.

**PTEROPUS MOLLIPILOSUS**, n. s.—Head small; ears large. Envergure great. Interfemoral membrane scanty. Tail very small, free. General hue olive brown: brighter upon the back of the neck, where a faint dusky-brown line is seen traversing the thick fur of this region. Antero-posteriorly a patch of the same hue lies upon each shoulder; that upon the back is thinner and darker. The interfemoral membrane is well furnished with soft olive brown hair, which becomes more scanty and shorter as it runs down the legs and the back of the feet to the claws. Back of the humerus and ulna thinly covered with the hair of the prevailing hue; anterior part of neck russet; belly of the same prevailing color as the back, with an inclination to dusky red upon the thighs.

\* This disposition of the superior incisors is peculiar. We know that these teeth frequently vary; as, for instance, in the genus *Hypoderma*, where the young animal has  $\frac{4}{4}$  and later in life  $\frac{2}{2}$ ; the elderly animal possessing but  $\frac{2}{0}$ . Thus, the difference in the number of the incisors is not of the importance which might at first sight be supposed. It is interesting, however, to know that this is the only instance of incisorial variation as yet seen among the species of *Epomophorus*.

Fine straggling hairs clothe the inferior surface of the ulna and humerus, and stretch out upon the membrane down along the sides of the body and upwards upon the interbrachial membrane. Everywhere the hair is very soft.

The skull is of medium size, not crested. The postorbital processes are long and incline outward and downward to within two lines of the zygomas. The intermaxillary bone is not thrown forward and downward as in other Pteropi, but is on the same level as the roof of the mouth. The first premolar above is larger than the incisors. The same tooth on the lower jaw is also of good size, but less tubercular than in other species.

The dimensions are as follows :

Length from nose to base of tail.....	8.0
“ “ “ commencement of membrane.....	3.0
“ of head.....	2.3
“ from nose to eye.....	1.0
“ “ eye to ears.....	0.6
Between eyes.....	0.9
“ ears.....	1.3
Height of ears.....	0.10
Length of tail.....	0.3
“ superior extremity.....	6.6
“ thumb.....	1.7 $\frac{1}{2}$
“ first joint.....	0.4 $\frac{1}{2}$
“ second joint.....	1.3
“ index finger.....	3.0
“ third “.....	8.0
“ fourth “.....	6.5
“ fifth “.....	5.0
Envergure.....	26.0

It will be observed that the length of the inferior extremity and the expanse of wing membrane are greater than usual, when the other proportions are taken into consideration.

*Hab.*—Western Africa; discovered by M. Duchailu.

#### Descriptions of certain Species of DIURNAL LEPIDOPTERA, found within the limits of the United States and of British America.

BY WM. H. EDWARDS.

- |   |  |
|---|--|
| 1. <i>Melitæa mylitta</i> , nov. sp.        | 6. <i>Cœnonympha inornata</i> , nov. sp. |
| 2. “ <i>minuta</i> , nov. sp.               | 7. “ <i>ochracea</i> , nov. sp.          |
| 3. “ <i>nycteis</i> , Doubleday.            | 8. <i>Lycæna Anna</i> , nov. sp.         |
| 4. <i>Limenitis Weidemeyerii</i> , nov. sp. | 9. “ <i>Scudderii</i> , nov. sp.         |
| 5. <i>Satyrus Silvestris</i> , nov. sp.     | 10. “ <i>fuliginosa</i> , nov. sp.       |

*MELITÆA MYLITTA*, nov. sp. Expands 1.2 inch.

*Male.*—Upper side fulvous; fringe of primaries alternately black and white, of secondaries white; on hind margin of primaries a broad black border, in which is a series of fulvous lunules, the middle one largest and projecting, preceded by a sinuous row of round fulvous spots which increase in size towards the inner margin; next, a fulvous band, the upper half of which intersects the preceding row at the fifth spot, making it appear bifid on the costal margin; this band is edged anteriorly by a black line which is dilated on costal and on inner margin; on the discal arc a fulvous streak entirely edged with black; base of both wings covered by wavy confluent black lines, as in *Tharos*.

Secondaries have a narrow black marginal border, on the anterior edge of which is a row of fulvous lunules, the one next the anal angle bisected longi-

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gradually by a black line; above these a row of black dots, the one in the anal angle oblong; on the costal margin near the outer angle a black patch, from which an interrupted dark line crosses the wing to near the abdominal margin.

Under side: primaries pale fulvous, clouded with yellowish on the apex and hind margin; the black markings on the disk of upper side indicated below from the transparency of the wing; a black patch near the inner angle, a faint black streak on costal margin and another on inner margin corresponding with the dilated extremities of the line above; both wings bordered by lunules.

Secondaries yellowish, clouded with brown on the disk and on the hind margin; the middle lunule white and arrow-shaped, those next the angles yellowish, the others dark brown; a row of brown points corresponding with the spots above; across the middle of the wing an irregular band of yellowish white edged with ferruginous; next the base several white or yellow-white spots edged with ferruginous.

*Female*.—One-third larger than the male, which it resembles; the marginal spots and transverse band on primaries are of lighter color, the latter tawny; the marginal lunules on secondaries are tawny; beneath, the lunules next the inner angles of secondaries are silver white, as are the band and the spots next the base; near the apex of primaries are four or five small silver spots.

Texas; Kansas; California.

This species appears to vary widely in color. Individuals are found blackish instead of fulvous, the wavy lines near the base lost in the uniform shade. The marginal spots and band are light colored, nearly yellow, but disposed as in the type above described; the under side exhibits little variation.

MELITÆA MINUTA, nov. sp. Expands 1.4 inch.

Upper side orange fulvous; a narrow black border upon the hind margin of both wings, within which is a series of fulvous lunules; preceding the black border a narrow common fulvous band edged anteriorly with black, and enclosing on costal margin of primaries a transverse row of four obsolete white spots; from this band to the base both wings are marked by transverse, undulated black lines; base clouded with brown; costa of primaries brown; fringe white, cut with black at the intersection of the nervures.

Under side orange, brighter on secondaries; a narrow white border on the hind margin of both wings; anterior to this a series of white lunules, each edged with black; on costal margin of primaries a transverse row of four white spots; beyond this to the base black markings as on upper side; on secondaries the lunules are preceded by an immaculate orange band, beyond which is a broad transverse white band containing three rows of black spots, somewhat irregularly placed, and mostly oblong; some of the middle row circular; another irregular white band crosses the wing towards the base, edged with black spots; at the base a white spot edged with black.

Texas. From the collection of Mr. J. W. Weidemeyer, of New York.

MELITÆA NYCTEIS, Doubleday. Expands 1.4 inch.

*Male*.—Upper side tawny; fringe long, with alternate bars of black and white; primaries next the base crossed by black undulated lines edged without by a zigzag black band which is dilated on the costal and on inner margin; a broad black border on hind margin and apex, within which along the margin is an interrupted series of points, the middle one lunular, the two next the apex white, the others tawny; preceding these a transverse sinuous row of small spots, nearly round, tawny, except the two on the costal margin, which are white and minute; between the black border and the zigzag band a broad sinuous tawny band common to both wings.

Secondaries next the base greenish-black, lightly sprinkled with tawny atoms, and marked by two or three patches of same color, the outline less

irregular than on primaries; on hind margin a narrow black border, which extends also along the costal margin to the common tawny band; from its anterior edge on the costa, a wavy black line crosses the disk and terminates inside the abdominal margin; upon the hind margin a series of yellow lunules, the third from the anal angle largest and projected; above these a broad tawny band, edged anteriorly by the wavy black line, encloses a row of six black spots, the middle one largest, the one in the anal angle long; abdominal margin paler than disk.

Under side: primaries tawny, next the base showing faintly the black markings of the upper side; a small patch of black on inner margin; hind margin and apex pale brown, clouded and spotted on the apex with white; a marginal series of arrow-shaped spots of yellowish-white, the third from the inner angle and two next the apex largest; anterior to these, the transverse row of spots on upper side is reproduced faintly; secondaries pale brown, clouded in the disk and on hind margin with black; a marginal series of unequal silver lunules; above these a row of six black spots edged with yellow, the first next the costa nearly obsolete, the second and third round, the fourth and fifth semi-oval, and the sixth long; the fourth faintly pupilled with white; across the middle of the wing an irregular silver band, and between this and the base several silver spots, all edged with dark brown; within the cell two small yellow spots; body above greenish-black, beneath white; antennæ brown, annulated with white; club reddish-brown.

*Female*.—One-third larger than male, which it closely resembles; the marginal spots on primaries beneath are long and attenuated; the silver lunules of secondaries take the form of a deeply crenated band; a distinct silver pupil in the fourth black spot.

Illinois; Missouri.

*LIMENTIS WEIDEMEYERII*, nov. sp. Expands 2.6 inch.

*Male*.—Upper side brownish-black, with a broad common white band a little beyond the middle, making an obtuse angle within on the primaries and tapering towards the abdominal margin of secondaries, divided into long spots by the nervures; posterior to this band on secondaries an obsolete row of fulvous spots; within the hind margin of both wings a series of small white spots, minute on secondaries; between these and the band on costal margin of primaries a short transverse row of four white spots, the second largest, the fourth minute; crenations white.

Under side paler, with a common white band and four white spots on primaries as above; on secondaries a row of fulvous spots posterior to the band; a little within the hind margin of both wings a series of large lunules cut transversely and unequally by a crenated black line parallel to the margin; these lunules are bluish-white except towards apex of primaries, where the inner row is white; on primaries a narrow ferruginous band upon the discal arc, followed within the cell successively by blue atoms, a bluish-white band and a ferruginous band, both narrow, transverse and oblique; next the base blue atoms; costa ferruginous; on secondaries the broad abdominal margin is bluish-white; the entire space between the band and the base is striped transversely with white and bluish-white, divided into spots by the nervures, with ferruginous lines between the stripes; costa white; body above black; beneath white, with a black stripe along the side of abdomen; palpi and legs white; antennæ and club brownish-black.

Rocky Mountains. From the collection of Mr. J. W. Weidemeyer.

*SATYRUS SILVESTRIS*, nov. sp. Expands 1.9 inch.

*Male*.—Upper side brown; fringe same color; behind and along the discal cell of primaries a dark patch extending from the base half way to the apex; near the apex a small round black spot with a faint iris; a black point near the inner angle. Under side paler; primaries with a tinge of yellow; two

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ocelli corresponding to the spots above, the larger next the apex, each with white pupils and yellow iris; the disks of both wings finely streaked with dark brown; a dark line parallel to and near the hind margin of primaries; on secondaries are two dots,—a white one in the anal angle, a dark one near the apex.

*Female*.—Same size as the male, a little lighter color; near the apex of primaries a single spot; the dark patch as in the male; on the under side two dots near the anal angle of secondaries.

California. From Dr. H. Behr, San Francisco.

*CENONYMPHA INORNATA*, nov. sp. Expands 1·4 inch.

*Male*.—Upper side ochrey brown, lighter in the disk of all the wings; costal margin of primaries and abdominal margin of secondaries greyish; no spots above or below; fringe grey, crossed by a darker line.

Under side: primaries same color as above from the base to beyond the middle; then a transverse sinuous ray of paler color, and beyond this to hind margin greyish; sometimes this ray disappears, the basal color extending nearly to the apex; secondaries grey with a slight greenish tinge, darker from base to middle, and this shade separated from the paler margin by a transverse, tortuous, interrupted ray, the course of which is parallel to the hind margin.

*Female*.—Wholly dull ochrey yellow, marked as the male.

Lake Winnipeg. From Mr. Robert Kennicott.

*CENONYMPHA OCHRACEA*, nov. sp. Expands 1·4 to 1·6 inch.

*Male*.—Upper side entirely of a bright, glossy ochre yellow, without any spot or mark, except what is caused by the transparency of the wings; base of both wings dark grey; abdominal margin of secondaries pale grey; fringe pale grey, crossed by a darker line.

Under side: primaries same color as above; costal margin, apex and base greyish; near the apex a round, sometimes rounded-oblong, black spot with white pupil and pale yellow iris; this is preceded by an abbreviated, pale yellow, transverse ray.

Secondaries light reddish-brown, greyish along the hind margin; abdominal margin and base dark grey; near the hind margin and parallel to it is a series of six black dots, sometimes obsolete, usually with white pupil and broad yellow iris; near the base two irregular pale brown spots, and midway between the base and the hind margin a sinuous, interrupted ray of same color, extending nearly across the wing.

Female like the male.

Lake Winnipeg; California; Kansas.

*LYCENA ANNA*, nov. sp. Expands 1·3 inch.

*Male*.—Upper side violet blue with a pink tinge, brighter at the base and on costal margin of primaries; hind margin of both wings narrowly edged with black, which in the primaries extends slightly along the nervures and the costal margin; fringe white.

Under side greyish-white with a tinge of blue at the base; primaries with a discal streak, followed by a transverse series of six small black spots, the one next the inner angle double and the fifth largest; both wings bordered by rusty spots surmounted by black crescents, the four or five nearest the anal angle powdered posteriorly with silver atoms; secondaries have three small spots near the base, an obsolete discal spot, and a transverse series of eight small spots in a double unequal curve.

*Female*.—Upper side light brown, with an obsolete discal spot on primaries; hind margin of both wings bordered by a series of fulvous crescents, which in the secondaries partly enclose spots of dark brown. Under side fawn-colored, marked as in the male.

California. From Dr. H. Behr.

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*LYCÆNA SCUDDERII*, nov. sp. Expands 1.1 inch.

*Male*.—In size, form and color resembles *Ægon* of Europe. Upper side dark violet blue; hind margin of both wings and costal margin of secondaries edged with black; costal margin of primaries has a fine black border; fringe white.

Under side dark grey; primaries have an oval black discal spot, a transverse, tortuous series of six black spots, all edged with white, the one next the inner angle double, the fifth twice as long as the others; on the hind margin a double series of faint spots; secondaries with four black spots near the base, one being very close to the inner margin, and minute; a discal streak and a series of eight spots in a double unequal curve, all of which, as well as the basal spots, are edged with white; a marginal series of six or seven metallic spots, each surmounted by a spot of fulvous, which is bordered anteriorly by a dark crescent; these metallic spots are edged posteriorly and sometimes replaced by black; ends of nervures expanded into small black spots.

*Female*.—Upper side brown, with a black discal spot on primaries; secondaries with a marginal row of obsolete spots surmounted by greyish crescents. Under side pale buff; primaries as in the male, except that the discal spot is preceded by a small double spot, and all the spots are larger; on the secondaries the spots are less distinct and some of them wanting; the transverse series is set in a band of white; marginal spots without the metallic gloss.

Lake Winnipeg. From Mr. S. H. Scudder, of Cambridge, Mass.

*LYCÆNA FULIGINOSA*, nov. sp. Expands 1.3 inch.

*Male*.—Upper side entirely blackish-brown; fringe lighter. Under side light brown, with a dark discal spot and a double row of rusty points parallel to the hind margin of both wings, the outer row on primaries obsolete.

Female a little larger, of lighter color both above and below, but similarly marked.

California. From Dr. H. Behr.

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#### Notes on some Genera of Fishes of the Western Coast of North America.

BY THEODORE GILL.

The preparation of a report on the fishes collected by the naturalists and other gentlemen connected with the North Western Boundary Survey having been intrusted to me, I have examined almost all of the different species that have been described from our Pacific waters. Such an examination soon convinced me of the imperfect arrangement of many of our types, and has induced me to undertake a careful revision of the entire ichthyic Fauna. All of the families represented on our Pacific coast have been investigated, and their limits defined more rigorously than had been previously done; the genera have been restricted after a comparative study of exotic as well as of indigenous forms, and it has been attempted to distribute the allied genera among natural subfamilies and groups. As some time may yet elapse before the publication of the extended report, the following synopsis of some of the genera, founded on formerly described species, may be acceptable. The descriptions of new generic and specific types will be given at another time. The consideration of the true nomenclature of the other species and their synonymy is reserved for the Report.

#### PERCOIDS.

##### I. ATRACTOPERCA Gill.

Under the name of *Paralabrax*, Dr. Girard has confounded two different generic types of Serraninæ. The first species of his genus being the *Parala-*

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*brax nebulifer*, the name may be restricted to it. For the second species, a new generic name must be then framed: that of *Atractoperca* may be given. *Atractoperca* bears nearly the same relation to that genus of which the *Serranus scriba* of the Mediterranean Sea is the type, as does *Paralabrax* to *Epinephelus*. It differs from *Paralabrax* by the conical head and the naked inter-orbital area.

1. ATRACTOPERCA CLATHRATA Gill.

*Syn.* *Labrax clathratus* Girard.

*Paralabrax clathratus* Girard.

II. ARCHOPLITES Gill.

This genus is proposed for the *Ambloplites interruptus* of Dr. Girard. It differs from *Ambloplites* by the greater prominence of the lower jaw, the presence of two bands of teeth on the tongue instead of one, and the greater development and different structure of the spinous portions of the dorsal and anal fins.

2. ARCHOPLITES INTERRUPTUS Gill.

CHÆTODONTOIDS.

III. PAREPHIPPUS Gill.

The American Chætodontoids, referred to the genus *Ephippus* by Cuvier, differ from the typical species by the smaller size of the scales and the form of the dorsal fin as well as of the anal. Such differences are of generic value in this group; the American species are consequently referred to a new genus.

Type. *Parephippus gigas*.

*Syn.* *Ephippus gigas* Cuv.

3. PAREPHIPPUS ZONATUS.

*Syn.* *Ephippus zonatus* Girard.

POMACENTROIDS.

IV. HYPSTYPOPS Gill.

This genus is intended to embrace some fishes which have been referred to *Glyphisodon* but which essentially differ. The head has a different form, resulting from the suborbital bones, which are as high as long. The teeth are also blunt and entire, and not notched at their crowns.

4. HYPSTYPOPS RUBICUNDUS.

*Syn.* *Glyphisodon rubicundus* Girard.

SCORPÆNOIDS.

V. SEBASTODES Gill.

This genus is framed for the *Sebastes paucispinis* of Ayres. It has a very different facies from *Sebastes*, and is readily distinguished by the longer body, the very protuberant lower jaw, which has a symphiseal swelling beneath, the minute scales, the form and armature of the head, the deep emargination of the dorsal fin and the emarginated caudal.

5. SEBASTODES PAUCISPINIS.

*Syn.* *Sebastes paucispinis* Ayres, Girard.

CHIROIDS.

VI. CHIRUS (Steller) Cuv.

The name of *Chirus* must be retained in place of *Chiropsis*, as the former 1861.]

name was proposed for a species of that genus. Its generic characters are the presence of the palatine teeth, the notched dorsal fin and the three supernumerary nearly perfect lines on each side.

#### VII. ACANTHOLEBIUS Gill.

The *Chiropsis nebulosus* of Girard differs from the true *Chiri* by the development of the spinous dorsal, the presence of only three continuous supernumerary lines on each side, and the absence of palatine teeth. It is as nearly allied to *Hexagrammus* as to *Chirus*.

#### 6. ACANTHOLEBIUS NEBULOSUS.

*Syn. Chiropsis nebulosus Girard.*

#### VIII. PLEUROGRAMMUS Gill.

Among the fishes referred to *Chirus* or *Labrax*, there is one distinguished by the presence of teeth on the vomer and palatines, an entire dorsal fin, and the possession of one supernumerary dorsal and two supra-anal lines. For this species, the generic name of *Pleurogrammus* is offered.

#### 7. PLEUROGRAMMUS MONOPTERYGIUS.

*Syn. Labrax monopterygius Pallas.*

#### IX. GRAMMATOPLEURUS Gill.

The *Labrax lagocephalus* of Pallas is the type of another unnamed genus of Chiroids. It is distinguished from all others of its subfamily by its cycloid scales. The dorsal is divided, and there are four supernumerary lines on each side.

#### 8. GRAMMATOPLEURUS LAGOCEPHALUS.

*Syn. Labrax lagocephalus Pallas.*

#### X. ANOPILOPOMA Ayres.

This genus is a valid and very distinct one, but its describer has mistaken its affinities. It is a Chiroid, but is the type of a distinct subfamily.

#### COTTOIDS.

#### XI. MEGALOCOTTUS Gill.

The *Cottus platycephalus* of Pallas appears to be most nearly related to the genera *Porocottus* and *Boreocottus* Gill, but to be distinguished by the presence of palatine teeth.

#### 9. MEGALOCOTTUS PLATYCEPHALUS.

*Syn. Cottus platycephalus Pallas.*

#### XII. CLINOCOTTUS Gill.

*Clinocottus* differs generically from the *Oligocottus maculosus* Girard, by the absence of palatine teeth, the presence of prickles on the body, the entire anal fin and the form of the head.

#### 10. CLINOCOTTUS ANALIS.

*Syn. Oligocottus analis Girard.*

#### XIII. BLENNICOTTUS Gill.

This genus has been also confounded with *Oligocottus* by Girard, but decidedly differs in the form of the head, its armature, and the structure of the anal fin.

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## 11. BLENNICOTTUS GLOBICEPS.

*Syn.* *Oligocottus globiceps Girard.*

## XIV. CERATOCOTTUS Gill.

One of the characters assigned to this genus in the original remarks on it was the absence of vomerine teeth. On subsequent observation, they were detected. The diagnosis must be consequently modified. It is much regretted that such an error should have occurred.

## AGONOIDS.\*

## XV. ANOPLAGONUS Gill.

This genus is allied to *Aspidophoroides*, but is readily distinguished by the presence of vomerine and palatine teeth.

## 12. ANOPLAGONUS INERMIS.

*Syn.* *Aspidophoroides inermis Günther.*

\* The family of Agonoids may be divided into four groups,—the Podotheci, Hypsagoni, Agoni and Anoplagoni. It may be further divided as follows:—

## Group I. PODOTHECI.

Genus *PODOTHECUS* Gill.

## Group II. HYPHAGONI.

*HYPHAGONUS* Gill.

Type. *Hypsagonus quadricornis* Gill.

*Syn.* *Aspidophorus quadricornis Cuv. et Val.*

## Group III. AGONI.

*HIPPOCEPHALUS* Swainson.

Type. *Hippocephalus Japonicus* Gill.

*Syn.* *Cottus Japonicus Pallas.*

*Agonus stegophthalmus Tilesius.*

*AGONUS* Bloch.

Type. *Agonus cataphractus* Bloch.

*PARAGONUS* Gill.

Type. *Paragonus acipenserinus.*

*Syn.* *Agonus acipenserinus Tilesius.*

*AGONOPSIS* Gill.

Type. *Agonopsis chiloensis* Gill.

*Syn.* *Aspidophorus chiloensis Kroyer.*

*LEPTAGONUS* Gill.

Type. *Leptagonus spinosissimus* Gill.

*Syn.* *Aspidophorus spinosissimus Kroyer.*

*BRACHYOPSIS* Gill.

Type. *Brachyopsis rostratus* Gill.

*Syn.* *Agonus rostratus Tilesius.*

## Group IV. ANOPLAGONI.

*ANOPLAGONUS* Gill.

Type. *Anoplagonus inermis* Gill.

*Syn.* *Aspidophoroides inermis Günther.*

*ASPIDOPHOROIDES* Lac.

Type. *Aspidophoroides monopterygius* Lac.

1861.]

## BLENNOIDS.

## XVI. HETEROSTICHUS Girard.

*Heterostichus* has been recently correctly recognized by Dr. Günther to be very nearly related to the genus *Myxodes*; it is not at all allied to the *Trachinoids*. It differs from *Myxodes* in dentition and several other characters.

## XVII. HYPLEUROCHILUS Gill.

This genus was proposed in the "Catalogue of the Fishes of the Eastern Coast of North America" for the *Blennius multifilis* of Girard. It is distinguished from *Blennius* by its restricted lateral branchial apertures. From *Chasmodes* and other genera having a similar restriction, it is more remotely separated by its form and other characters. A Blennoid of the Pacific coast described by Girard is nearly allied to the type.

## 13. HYPLEUROCHILUS GENTILIS.

*Syn. Blennius gentilis* Girard.

## XVIII. BROSMOPHYCIS Gill.

Dr. Ayres has described a remarkable Gadoid of California, which has much of the general appearance and the single dorsal of the *Brosmi*, but has no mental barbel, and the ventral fins are represented by single filaments. The species so characterized has been referred to *Brosmius*, but it is evidently very distinct from that genus, and is the type of a new one. On account of the union of some of the features of *Brosmius* and *Phycis*, the name of *Brosomphycis* may be given to it.

## 14. BROSMOPHYCIS MARGINATUS.

*Syn. Brosmius marginatus* Ayres.

## On a new type of AULOSTOMATOIDS, found in Washington Territory.

BY THEODORE GILL.

Among the new types of fishes discovered by Dr. Kennerly and other gentlemen attached to the North-western Boundary Survey, there is one especially worthy of notice. It belongs to the family of the Aulostomatoids, but is at once distinguished from all the other genera of that family by the comparatively advanced position of the ventral fins, they being inserted a little behind the bases of the pectoral. The species is evidently quite nearly allied to the spine-bearing members of the family, but may be considered the type of a distinct subfamily. The genus *Polypterichthys*, of Bleeker, is more nearly allied to *Aulostoma* than to the North American genus, and those two genera may be united in one subfamily distinguished from our new genus, and from the recently described *Siphonognathus* of Sir John Richardson. The relations of the genus will be discussed more fully in the Report on the Fishes of Western North America. We here offer a simple synopsis of the family and the diagnosis of the new genus. The family Aulostomatoideæ is now restricted to the elongated subcylindrical or subtæniiform fishes, with the mouth at the extremity of an elongated tube formed by the nasal and vomerine bones, and the preopercular, interopercular, pterygoid and tympanic ones. The genera *Centriscus* and *Amphisile* are only remotely allied to them.

The family of Aulostomatoids still contains, after the removal of *Centriscus* and *Amphisile*, five genera, which may be distributed as follows :

Subfamily SIPHONOGNATHINÆ Gill.

SIPHONOGNATHUS Rich.

*Siphonognathus* Richardson, Proc. Zoological Society of London, Nov., 1857; *ib.* in Annals and Magazine of Nat. Hist., vol. i. p. 226.

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Subfamily AULOSTOMINÆ Gill.

AULOSTOMA Lac.

POLYPTERICHTHYS Bleeker.

*Polypterichthys Bleeker*, Natuurkundig Tijdschrift voor Nederlandsch Indie, vol. iv, p. 608.

Subfamily AULORHYNCHINÆ Gill.

AULORHYNCHUS Gill.

Subfamily SIPHONOSTOMINÆ Gill.

SIPHONOSTOMUS (Klein) Gron.

*Fistularia Linn.*

*Channorhynchus Cantor.*

Genus AULORHYNCHUS Gill.

Body moderately elongated and almost cylindrical. Tail from the dorsal and anal fins elongated conical and slightly depressed, merging into the very slender and depressed caudal peduncle. Skin naked. Lateral line marked by a continuous row of short canals. Head with the skin naked. Mouth small, horizontal, and at the end of a flexible tube about as long as the rest of the head. Intermaxillary bones much expanded, and with long and slender posterior processes. Teeth on the snpramaxillary and dentary bones nearly uniserial. Palate edentulous. Nostril with raised margin, rather distant from front of eye. Branchiostegal rays 4—4. Dorsal spines numerous, equal and very short, commencing above the pectorals. Dorsal and anal fins posterior, nearly equal, oblong, and elevated in front. Caudal fin small and emarginated. Pectoral fins also emarginated, the superior and inferior rays being longest. Ventral fins inserted not far behind the bases of the pectoral; each with a slender spine and five branched rays.

AULORHYNCHUS FLAVIDUS Gill.

Tawny, minutely punctulated with black above and on the sides, immaculate beneath. Snout with a lateral yellowish line. Operculum and suboperculum with a golden lustre: the former also punctulated above. Ante-pectoral or humeral region lustrous golden, bordered above by a blackish band parallel with the superior pectoral rays.

D. spines xxvi. D. 10. A. I. 10. P. 1, 18, 1. V. I. 5.

The proportions, in hundredths, are as follows:

Total length, 5 inches.....	100
Body—Height of body.....	6
“    behind dorsal.....	4½
Width behind dorsal.....	4½
Head—Length of head.....	25
Distance between snout and preoperculum.....	18
“    “    “    orbit.....	12
“    “    orbits.....	3
Height of head.....	5½
Greatest width of head.....	4½
Diameter of eye.....	4
Dorsal—Distance of dorsal fin from snout.....	49
Length of dorsal fin.....	9
Greatest height.....	7

Caudal—Length of median caudal rays.....	5
“ longest caudal rays.....	6
Pectoral—Length of pectoral fins.....	10
Distance from snout.....	27½
Ventral—Length of ventral fins.....	5
Distance from snout.....	31

A detailed description will be given in the Report on the Ichthyology of the North Western Boundary Survey.

Three specimens of the species were obtained.

### A Monograph of the TRINGEÆ of North America.

BY ELLIOTT COUES.

In the latter part of 1860, during the examination at the Smithsonian Institution of an extensive and valuable collection of birds made by Messrs. Robert Kennicott and Bernard R. Ross in the vicinity of Great Slave Lake and McKenzie's River, my attention was directed to a Sandpiper, nearly allied to *Actodromas maculata* and *Bonapartei*, but differing from both in many important features. Subsequent examination having proved it to be without doubt distinct from these, or any other North American Sandpipers, I was authorized by the Secretary of the Institution to describe and name it. To do so properly, necessarily involving a somewhat extended study of the North American Sandpipers, I was induced to undertake a monographic sketch of the section, as well as of the particular genus to which the new species belongs.

In the following pages it has been attempted to present the leading features of the group; to give the diagnosis of the several genera and species, with a detailed description when such appeared necessary; together with the synonymy of each species and a discussion of doubtful points of nomenclature and affinity. In how far, however, this aim has been accomplished, must be left for others to judge.

It is with great diffidence that on some points I dissent from such high authority as that of the author of the *Tringæ* in the General Report; but when compelled to do so, the reasons are fully stated, which, it is hoped, will be found satisfactory.

To Professor Henry, Secretary of the Smithsonian Institution, my grateful acknowledgments are due for the opportunity of examining at leisure the entire Smithsonian collection of Sandpipers, and also for access to those works necessary to the compilation of the list of synonyms. The references have all been personally made and verified, except in a few cases for which the authority is given. Though the list is necessarily incomplete, it is believed that no important synonym is omitted. Should, however, errors be detected in this or in any other portion of the article, it is hoped that they will be found to be others than those of negligence or carelessness.

By many modern ornithologists the Sandpipers are considered as a subfamily *Tringine* of *Scolopacide*, equal in rank to the *Scolopacine* and *Totanine*. But the relationships of the two former in all essential points are very intimate, and the transition from the one to the other, through such genera as *Macroramphus* and *Micropalama*, very gradual, while at the same time the differences from the *Totanine* are marked and decided. In view of these considerations, it may be more natural to consider the Sandpipers as a section of *Tringæ* of equal rank with *Scolopacæ*, uniting both under the subfamily *Scolopacine*. Upon this basis the different groups may be distinguished by the following brief characters, taken chiefly from the General Report.

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Family *SCOLOPACIDÆ*.

Bill variable in length, but at least as long as the head, grooved to beyond the middle. Legs with transverse scutellæ before and behind, (except in *Numeniæ*.) Toes not broadly margined to the tips, with or without a basal web. Hind toe generally present.

*Scolopaciæ*. Bill covered with soft skin to the sensitive, vascular, usually more or less laterally expanded tip. Gape of mouth very small, not extending beyond the base of the culmen. Bare portion of tibiæ short. Legs generally rather short and stout. Toes usually cleft to the base. Body stout, neck rather short.

*Totaniæ*. Bill covered with soft skin only towards the base, the terminal portion being hard, horny, and usually unexpanded and attenuated. Gape of mouth considerable, extending beyond the base of the culmen. Tibiæ bare for a considerable distance. Legs slender and lengthened. Toes usually with a basal web.

Subfamily *SCOLOPACINÆ*.

*Scolopacææ*. Bill much longer than the head or naked leg, extremely sensitive. Upper mandible with a longitudinal furrow near the end, and its tip thickened and bent down over the lower. Roof of mouth not excavated to the tip. External ear beneath or anterior to the eye. Tail usually banded.

*Tringææ*. Bill shorter than the naked leg, the tip less sensitive than in the preceding, more or less laterally expanded, but not thickened. Roof of mouth excavated to the tip. Culmen without a decided longitudinal groove. External ear posterior to the eye. Tail usually without bands.

The preceding diagnoses indicate, in a general way, the principal characters of the several groups, and distinguish the *Tringææ*. The latter, at least as far as North American forms are concerned, may be thus more definitely characterized.

The bill is straight or slightly decurved, at least as long as the head, and sometimes considerably exceeding it; rather slender, usually more or less compressed, seldom much depressed. The tip is usually more or less expanded, and sensitive and vascular, that of the upper mandible bent a little over that of the lower. The grooves in both mandibles extend to the expansion of the tip; that of the upper is much the widest, but both are deep and distinct. In some genera there are decided indications of a longitudinal furrow on the culmen near the end. The nostrils are linear, pervious, very narrow, situated in the sinus of the upper mandible, usually very near its base, but sometimes considerably advanced. The angle formed by the rami of the lower jaw is very small, the enclosed space being long and narrow, and the groove marking the line of union of the rami usually extending about two-thirds the length of the bill, but sometimes nearly to the tip. The extent of the encroachment of the feathers on the bill varies in the different genera; but, except perhaps in *Ancylocheilus*, it is always greater between the rami than on the sides. The wings are long, pointed and powerful; the first primary is usually the longest, but the second is nearly, sometimes quite, equal to it. The rest are all rapidly graduated. The secondaries are very short and inconspicuous. The edge of the outer vane is obliquely incised at the extremity. The tertiaries are usually long, slender and tapering, sometimes nearly equaling the primaries in length. The tail is rather short, usually doubly emarginate, the central feathers pointed, and projecting somewhat beyond the others. The legs and feet vary greatly in their character in the different genera, always, however, being constant in each. Except in *Arquatella* and *Tringa*, the tibiæ are always exposed for a considerable portion of the length of the tarsus, and in those genera the bare portion is considerable. Except in *Arquatella*, *Actodromas*, and perhaps *Ereunetes*, the tarsus is always decidedly

longer than the middle toe and claw. The toes are usually long and slender, more or less margined at the sides, and flattened underneath; free at the base, or with a very rudimentary membrane, except in *Micropalama* and *Ereunetes*. The lateral are nearly equal to the middle, the outer slightly longer than the inner. The hind toe is present, except in *Calidris*. The claws vary considerably in length, acuteness and amount of curvature, but they are always dilated on the inner edge.

With respect to coloration, the *Tringæ* of North America, with scarcely the exception of *Arquatella maritima*, present a general similarity in the pattern and disposal of the markings of most of the parts. The feathers of the upper parts have their centres very dark, and are margined with some shade of reddish, yellowish, or white, the color being deepest on the scapulars. The primaries are uniformly deep dusky, without spots or bars, and are darkest at the tips and on the outer vanes. The shafts of all are white for some portion, usually the central. The secondaries are ashy-gray, bordered to a greater or less extent with white. The central tail feathers are usually considerably darker than the lateral; but neither show any approach towards the transverse bars so universal among the *Scolopacæ* and *Totaniæ*. Any attempt, however, at a generalization of the color of the under parts seems impossible, since, as will be seen in the diagnoses of the species, they are found of very various patterns and colors.

The species inhabiting North America are divisible into eight well-marked genera, among which are comprised nearly all the more important ones, though some, such as *Eurimorhynchus* and *Limicola*, have no representatives. The most extensive of these, *Actodromas*, seems to contain two well-marked groups, at least sub-generically distinct. Each of the others comprises but a single admitted North American species; and of some, such as *Tringa*, *Arquatella*, and *Ancylocheilus*, but one species is at present known. The characters of the most importance among the *Tringæ* seem to lie in the legs. The proportions of tibia, tarsus and middle toe, and their relations to the bill, readily characterize definitely the groups. They are also the most constant, being subject to very little variation in each species. This is as might be expected, from their radical nature, since the most important and essential character in any group should be the least subject to variation. The bill, on the other hand, differs much in length in the same genus or species; it reaches its maximum of variation in *Ereunetes*, and is most constant throughout the genus *Actodromas*. The wings and tail vary somewhat, but within very narrow limits.

The North American genera of *Tringæ* may be readily characterized by the proportions of bill, tarsus and toe, without reference to the tail or wings, though these of course furnish additional characters. The following schedule, in which the characters are purposely made as brief as possible, will serve to define the genera as adopted.

#### *Synopsis of Genera.*

#### A. Toes with a decided basal web.

Bill equal to tarsus, both very long; exposed portion of tibia equal to middle toe, which is not quite two-thirds the tarsus,

*Micropalama.*

Bill equal to tarsus, both moderate; tibia exposed for two-thirds the middle toe, which nearly equals the tarsus,

*Ereunetes.*

#### B. Toes cleft to the base, or with a very rudimentary membrane.

##### I. Bill longer than the tarsus.

##### 1. Bill straight; tibia moderately or scarcely at all exposed.

Tarsus longer than the middle toe, hind toe present, *Tringa.*

As in *Tringa*; hind toe absent, *Calidris.*

Tarsus shorter than the middle toe, *Arquatella.*

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2. Bill decurved; tibia much exposed.  
 Bill compressed; legs long, slender; middle toe  
 not quite three-fourths the tarsus, *Ancylocheilus*.  
 Bill depressed; legs moderate, stout; middle toe  
 nearly or about equal to tarsus, *Pelidna*.
- II. Bill equal to the tarsus.  
 Tarsus equal to middle toe, *Actodromas*.

The most natural succession of the genera appears to be that presented above, viz.: *Micropalama*, *Ereunetes*, *Tringa*, *Calidris*, *Arquatella*, *Ancylocheilus*, *Pelidna*, *Actodromas*. *Micropalama*, in its long, slender, sensitive bill, somewhat furrowed culmen and digital web, seems to form the natural connecting link between *Scolopaceæ* and *Tringææ*, through *Macroramphus*. *Ereunetes* is next most closely allied, having also the membrane to the toes; but here the bill and feet are shortened, and have nearly the proportions of *Tringa*, which most naturally succeeds. *Calidris* is in all essentials like *Tringa*, except the absence of the hind toe. In *Arquatella* the bill is sometimes very slightly decurved; in *Ancylocheilus* and *Pelidna* it is successively more so. In the latter the middle toe becomes nearly or quite equal to the tarsus, opening the way for *Actodromas*, where the slender, attenuated bill, and much denuded tarsus, seem to lead directly to the *Totiniæ*.

If so great a subdivision of the *Tringææ* as is here presented be objected to, it is replied that the variations in external form are so great that a single genus, in the modern acceptation of the term, cannot contain them all; and if more than one genus be adopted for those with fully-cleft anterior toes, it is not easy to stop short of the number here adopted. Ornithologists have indeed perceived how unnatural was the association of all the species under *Tringa*, and at different times, some of them very early, names have been proposed for all the groups. As early as 1800, the absence of the hind toe caused *Calidris* to be separated; and, in 1811, the webbed feet of *Ereunetes* were made the grounds of generic distinction. *Pelidna* of Cuvier, instituted in 1817 for the slender-toed smaller Sandpipers, was a further attempt at division; but that genus, as left by its author, still contained species very dissimilar; and, in 1829, *Ancylocheilus* and *Actodromas* were characterized. The great peculiarities of *Tringa himantopus* Bon. caused it, soon after its first discovery, in 1828, to receive subgeneric distinction from *Tringa*. It was not, however, till 1858, that *Arquatella*, a peculiar form, was characterized. But while in other groups, particularly among the smaller land birds, the divisions have been minute and greatly extended, there seems to have been a general reluctance on the part of ornithologists with regard to recognizing these divisions. It may be that in this group Nature allows more external variation in forms very closely allied than is usual; but until this is proved to be the case, it seems necessary, to keep pace with the progress of ornithology, to consider the characters of the different sections as of full generic value.

Having, it is thought, dwelt sufficiently upon the general features of the group, we proceed at once to characterize the different genera and species.

#### MICROPALAMA Baird.

*Hemipalama*, Bonaparte, Syn. 1828, 316. Typus *Tringa himantopus*, Bon. nec Bon. Obs. Wils. 1825. (Typus *T. semipalmata*, Wils.)

*Micropalama*, Baird, Gen. Rep. 1858, 726. Typus *T. himantopus*, Bon.

*Char.* Bill long, equalling the tarsus, straight or very slightly decurved, slender, very much compressed, tip much expanded and vascular for some distance. Culmen on the terminal half depressed, with two rudimentary, longitudinal furrows. Groove on the lower mandible narrow and indistinct. Wings moderate, pointed, first primary a little the longest. Tail of twelve [1861.]

feathers, short, nearly even or slightly doubly emarginate, the central feathers projecting but little. Legs very long; tarsus equal to the bill; exposed portion of tibia equal to middle toe, which is not quite two-thirds the tarsus. Toes with a decided basal membrane; flattened beneath, but only moderately margined. Hind toe well developed. Body slender; neck long.

A marked and very peculiar genus of Sandpipers, of which the most characteristic feature, in addition to the long compressed bill, is the remarkable elongation of the tibia and tarsus. The former is exposed for fully the length of the middle toe, and is bare for a tenth of an inch or more further. The tibial feathers are very short. The tarsus is nearly a third longer than the middle toe. The basal membrane of the toes, which, though much emarginated, is very considerable and decided, is greatest between the outer and middle toe, where it extends to the first joint. The wings and tail are moderate, and present no special peculiarities.

In the lengthened sensitive bill, basal membrane of the toes, and some other characters, *Micropalama* seems to have a close affinity to *Macroramphus*, and in a measure to connect by means of that genus *Scolopacea* and *Tringa*, possessing, nevertheless, all the distinguishing features of the latter section. Among the *Tringae* it comes nearest to *Ereunetes*, which has the basal web and the same relative free portion of bill and tarsus. The other characters, however, are widely different.

*Hemipalama* was proposed by Bonaparte in 1825 as a subgenus for the *Tringa semipalmata* of Wilson, but was subsequently used for the present bird. But as the generic characters are very different, the name cannot be used in this connection. *Micropalama* of Baird has as its type the *T. himantopus* of Bonaparte, and is the name which should be employed.

MICROPALAMA HIMANTOPUS, (Bon.), Baird.—Stilt Sandpiper.

*Tringa himantopus*, Bonaparte, Ann. N. Y. Lyc. ii. 1826, 157, [fide Gen. Rep.] Lesson, Manual Ornith. 1828, ii. 284. Swainson, F. B. A. 1831, ii. 350. Bonaparte, Am. Orn. 1833, iv. 89, tab. 25, fig. 3. Audubon, Orn. Biog. 1838, iv. 332, tab. 344; Id. Syn. 1839, 235; Id. Birds Amer. 1842, v. 271, tab. 334. Giraud, Birds L. I. 1844, 232.

*Tringa Douglassii*, Swainson, F. B. A. 1831, ii. 379, tab. 66.

*Tringa (Hemipalama) Douglassii*, Nuttall, Man. Orn. 1834, ii. 141, [cum fig.]

*Tringa (Hemipalama) himantopus*, Bonaparte, Spec. Comp. 1827, 61; id. Syn. 1828, 316. Nuttall, Man. Orn. 1834, ii. 138.

*Tringa (Hemipalama) Audubonii*, Nuttall, Man. Orn. 1834, ii. 140, [juv.]

*Hemipalama himantopus*, Bonaparte, Comp. List. 1838, 49. Dekay, N. Y. F. 1844, 235, tab. 86, fig. 196.

*Hemipalama multistriata*, "Licht." Gray, Genera, 1849, iii. 578.

*Totanus himantopus*, Lambeye, Av. Cuba, 1850, 95.

*Micropalama himantopus*, Baird, Gen. Rep. 1858, 726.

*Sp. Char.* Bill much longer than the head, very slightly decurved, much compressed; the tip flattened, expanded, punctulate. Wings moderate or rather long, first primary longest, the rest successively more rapidly graduated. Tail rather short, slightly doubly emarginate, the central feathers projecting but little. Legs very long; exposed portion of tibia equal to middle toe, which is two-thirds the tarsus. *Adult in spring*.—Upper parts very dark brownish black, deepest on the scapulars, each feather edged and tipped with white, light yellowish or reddish, which on the scapulars makes two or three deep indentations. A dusky line from bill to eye, and a light one over the latter to the occiput. Auriculars, and a continuous line beneath and in front of the eye, light chestnut red. A broad stripe of bright chestnut on each side of the occiput, confluent on the nape. Rump dusky; upper tail coverts white, transversely barred with wavy lines of deep dusky. Primaries deep dusky, the tips blackish. Tail ashy grey, central feathers scarcely darker, the mar-

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gins of all and a central field along the shaft white. Under parts white, the throat and jugulum streaked, and the other parts thickly and uniformly waved with transverse dusky bars, bordered with light reddish. Bill, legs and feet, dark greenish black. *Young.* Upper parts a uniform light greyish ash, the blackish feathers appearing at intervals; these and the dusky scapulars and wing coverts bordered with white. Upper tail coverts white, scarcely marked with dusky. Primaries as in the adult. Under parts white, the jugulum with an ashy suffusion, and obsoletely streaked. Slight traces of the reddish auriculars. Bill dusky black, legs and feet light greenish yellow.

Length 9.25, extent 16.75, wing 5.1, tail 2.3. Tarsus 1.6, middle toe 1, tibia exposed 1 inch.

*Habitat.*—North America, east of the Rocky Mountains.

The preceding diagnosis would characterize the species sufficiently well for ordinary purposes; but in view of the uncertainty whether there are not two or more species to be enumerated as inhabitants of North America, a somewhat more extended description may not be considered unnecessary. The following is taken from a very perfect male from Great Slave Lake in spring plumage; and the description of the supposed young is from a specimen from the Red Fork of the Arkansas.

The feathers extend on the lower mandible nearly in the form of a right angle, their upper outline being about parallel with the culmen, to a distance beyond those on the upper equal to half the distance of those between the rami. The crown of the head is blackish, streaked with white and with reddish. An ill-defined light line over the eye commences about half way between the eye and bill, and extends to the occiput, widening posteriorly. There is a dusky line between the eye and bill. The auriculars are light chestnut red, which color extends as a line beneath and before the eye to the white stripe above; interrupted by this, it commences above the stripe and passes over the side of the occiput to the nape, where it is confluent with the one on the opposite side. The hind neck is simply streaked with dusky and whitish. The middle of the back is black, each feather edged and tipped with light yellowish, which encroaches upon the central black in two or three irregular indentations. On the scapulars the edgings are tinged with reddish, and the indentations are more numerous and regular. The long tertials are blackish, evenly edged with chestnut passing into whitish at the tip. All the feathers of the back have a greenish gloss. The secondaries and greater coverts are light ashy edged with white, the lesser coverts darker with light borders. The primaries are dusky, their tips black, the shaft of the first brown passing into white, of the others black passing into brown; the tips of all black. The centre of the rump is dusky, the sides nearly white; the upper tail coverts white with numerous sagittate or wavy bars of deep dusky. The tail is very light ash, the central feathers scarcely darker, all with the margins and a central shaft field white, most of the inner vane of the two outer being white. The under parts are white; the throat very sparsely marked with minute dusky streaks, which on the jugulum are much larger and more numerous; these streaks on the breast change to transverse wavy bars of dusky bordered with reddish, which uniformly cover the whole under parts. These lines are thickest and most distinct on the breast, growing more obsolete in the middle of the belly, and are largest on the sides under the wings, where the reddish margins fill up the space between the bars on the same feather. There is little reddish on the under tail coverts, where the bars become more or less sagittate.

The young is very different from the adult in color, but presents much the same form and size. The upper parts are of a uniform light ashy, the blackish of the adult appearing in irregular patches. These dark feathers, as well as the scapulars, wing coverts and tertials are edged with white, the latter

1861.]

slightly tinged with reddish. The wings and tail are much as in the adult, the upper tail coverts, however, scarcely barred. The under parts are white; the jugulum, and, to some extent, the sides under the wings with a lighter wash of the color of the back, and with very obsolete streaks of dusky. The under tail coverts laterally are slightly streaked with dusky. There is an indistinct white line over the eye, and a dusky one between the eye and bill. The auriculars show traces of the reddish, but there is none to be perceived on the nape or sides of the occiput. The bill is black, as in the adult, but the legs are very different, being light greenish yellow.

The synonymy of this Sandpiper, in consequence of its very remarkable form and colors, is definite and well determined, though, as will be seen by the list given, various names have been applied to it by different authors. It was first introduced to the scientific world in 1826, by Bonaparte, in the *Annals of the N. Y. Lyceum*, under the name of *Tringa himantopus*. By the same author it was afterwards placed in his subgenus *Hemipalama*, (subsequently erected into a genus.) The type of this, however, being, as already stated, the *T. semipalmata* of Wilson, the name cannot of course be retained. Nearly all authors who speak of it employ *Hemipalama*, giving it either subgeneric or full generic rank. Lambeye, however, places the bird in *Totanus*, probably with reference to the long legs and the webbing of the toes. *Tringa Douglassii* of Swainson, is undoubtedly the present bird in mature plumage, though the figure indicates a more rufescent state of plumage than I have ever seen. The *Tringa himantopus* "Bon." of the same author, Nuttall, (page 40 of the *Manual*,) very precipitately "ventures to consider as a distinct species from the preceding" (*T. himantopus*,) and names it *Tringa (Hemipalama) Audubonii*, though retaining both the *T. himantopus* Bon. and *Douglassii* Sw. I have little doubt, however, that all three names refer to the same bird, the *Micropalama himantopus* of Baird (*General Report*, page 726) and of the present article.

#### EREUNETES Illiger.

*Ereunetes*, Illiger, *Prod.* 1811, 262; typus *E. petrificatus*, Ill.

*Hemipalama*, Bonaparte, *Obs. Wils.* 1825, 88. Typus *T. semipalmata*, Wils. Nec syn. 1828.

*Heteropoda*, Nuttall, *Man. Orn.* 1834, ii. 136. Typus idem. Nec *Latreillei*, 1804, fide *Gen. Rep.*

*Char.* Bill variable, about as long as the head, straight, quite stout, both mandibles deeply grooved to the considerably expanded, sensitive, vascular tip. Wings long, pointed; secondaries deeply obliquely incised; tertials narrow and elongated. Tail moderate, doubly emarginate, the central feathers pointed and projecting. Tarsus rather longer than middle toe, usually about equal to the bill. Bare portion of tibia two-thirds the tarsus. Toes connected by a broad basal web, and broadly margined. Hind toe well developed.

A genus well characterized among the *Tringæ* by the extensive webbing of the toes, a feature by which it may be readily distinguished from all other genera, except *Micropalama*. The other differences, however, from that genus are very great. The bill is much shorter, being about equal to the head, instead of very much longer. The middle toe is nearly equal to the tarsus, and the bare portion of the tibia is much less. The colors are very different. On the other hand *Ereunetes* comes very near to *Tringa*, with which it agrees in almost every particular, except that of the semipalmation of the toes. It appears to form the natural link between *Micropalama* and *Tringa* proper.

According to Cassin, (*Gen. Rep.* 724,) the genus *Ereunetes* of Illiger, is based upon a bird which has been proved, by actual examination of the type specimen, to be the *Tringa semipalmata*, Wils. *Ereunetes* must therefore supersede *Hemipalama*, Bon., and *Heteropoda*, Nutt., both instituted upon the same type.

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## EREUNETES PUSILLUS, (L.) Cassin.—Semipalmated Sandpiper.

- Tringa cinclus, Dominicensis minor*, Brisson, Ornith. 1760, v. tab. 37, fig. 3, [haud dubiè.]
- Tringa pusilla*, Linnæus, Syst. Nat. 1766, i. 252, [in præcedentem instituta.] [Nec Meyer.; nec Bechst.; nec Wils.] Gmelin, Syst. Nat. 1788, i. 681. Latham, Ind. Orn. 1790, ii. 737.
- ? *Tringa pusilla*, Vieillot, Nouv. Dict. 1819, xxxiv. 452.
- Ereunetes petrificatus*, Illiger, Prod. 1811, 262. Cassin, Gen. Rep. 1858, 724.
- Tringa semipalmata*, Wilson, Am. Orn. 1813, vii. 131, tab. lxxiii. fig. 3; id. Ord. Ed. 1829, iii. 132; id. Brewer, Ed. 1840, 542, fig. 225; ib. Syn. 725. Vieillot, Nouv. Dict. 1819, xxxiv. 462. Swainson, F. B. A. 1831, ii. 381. Audubon, Orn. Biog. v. 1839, 111, tab. 408; id. Syn. 1839, 236; id. Birds. Amer. 1842, v. 277, tab. 336. Giraud, Birds L. I. 1844, 239. Newberry, P. R. R. Surv. 1857, vi. 100.
- Tringa (Hemipalama) semipalmata*, Bonaparte, Obs. Wils. 1825, num. 212; id. Specc. Comp. 1827, 62.
- Hemipalama semipalmata*, Lambeye, Av. Cubæ, 1850, 96.
- Tringa (Heteropoda) semipalmata*, Nuttall, Man. 1834, ii. 136.
- Heteropoda semipalmata*, Bonaparte, Comp. List, 1838, 49. Dekay, N. Y. Fauna, 1844, 236, tab. 86, fig. 195. Gray, Genera, 1849, iii. 580.
- Ereunetes semipalmatus*, Cabanis, Schom. Reise. iii. 758, fide Gen. Rep. Bonaparte, Comptes Rend. xliii. 1856, fide Gen. Rep. Cabanis, Journ. fur Orn. 1856, 419, fide Gen. Rep.
- ? *Heteropoda mauri*, Bonaparte, Comp. List, 1838, 49, fide Gen. Rep.
- ? *Ereunetes mauri*, Gundlach, Cab. Journ. 1856, 419, fide Gen. Rep.
- ? *Hemipalama minor*, Lambeye, Av. Cubæ, 1850, 97.
- Tringa brevirostris*, Spix, Av. Bras. 1825, ii. 76, fide Gen. Rep.
- ? *Pelidna Brissoni*, Lesson, Man. d'Orn. 1828, ii. 277, [*T. pusillam*, Linn. citat.]
- Ereunetes pusillus*, Cassin, Proc. Acad. N. S. 1860, xiii. 195.
- Sp. char.* Bill stout, straight, variable in length, usually about equal to the head, the tip considerably expanded and punctulate. Feathers extending on the base of the bill to a nearly equal distance on both mandibles, their outline straight and vertical; those between the rami reaching but little further. First primary usually longer than the second, the rest equally graduated. Upper tail coverts very long; tail moderate, doubly emarginate, central feathers pointed and projecting. *Adult*.—Upper parts variegated with ashy, pure black, bright chestnut and white, each feather having a terminal black field, and being margined with reddish and tipped with white or ashy. Tertiaries dusky brown, edged with ashy or light chestnut; wing coverts and secondaries dusky ash edged with ashy white. Primaries deep dusky; shaft of the first white, the central portions of the others the same, their bases brown and tips black. Rump and upper tail coverts brownish black, the outer pair of the latter white barred with dusky. Central tail feathers dusky brown, the others light greyish ash scarcely edged with white. Beneath white; the throat and breast slightly rufescent, and with oval or cordate spots of brownish black, most numerous across the breast, and extending sparsely along the sides as shaft lines. Middle of belly and under tail coverts white, mostly immaculate. Bill and feet greenish black.
- Length* 6·5, wing 3·75, tail 2·1; bill (average) 1 inch; tarsus ·85, toe ·8, tibia, bare, ·50.
- Habitat*.—Entire temperate North America. Bahaha Islands.
- The present bird, the single admitted\* American representative of a genus

\* I am by no means satisfied that but a single species of *Ereunetes* exists in North America. The differences in size, in length and proportions of the tarsus even, and especially in the bill, cause it to seem almost impossible that all the specimens before me are specifically the same. Thus, the difference in the length of the tarsus, between the 1861.]

of such peculiar characters, requires comparison with no other sandpiper. *Actodromas minutilla* has much the same pattern of coloration, and sometimes approaches it in size; but the other differences are too great to allow of their being confounded.

The bill of this species varies most remarkably in length, the difference being *four-tenths* of an inch; it is always, however, quite stout. The tibia and tarsus vary somewhat, but within narrow limits. The proportions of the quills vary, but the first is usually longest. The tail is very decidedly doubly emarginate, the difference between the outer and next feather being nearly one-tenth of an inch; the third is the shortest. The upper tail coverts are very long, as are also the tertials. The winter and immature plumage shows little or none of the reddish, the feathers being mostly ashy with lighter borders. The young in July and August have scarcely any traces of the spots beneath, being almost entirely white, with a light buff wash across the breast. There is also much more white on the margins of the feathers of the upper parts.

With the exception of *Tringa canutus* and *Ancylocheilus subarquata*, there is perhaps no North American Sandpiper which has received such a variety of names as the present. Fortunately, however, the proper name to be employed is now pretty definitely determined. The subject of the generic appellation has already been discussed under *Ereunetes*, and it now only remains to settle the question of the specific denomination. The first notice of the species is in 1760, by Brisson, who, in his *Ornithologia*, describes and figures a *Tringa cinclus Dominicanensis minor*, which can be no other than the present bird. The description applies well, and the figure plainly shows the webbing of the toes, a feature entirely peculiar among the smaller *Tringee*. It was upon this bird that Linnæus, in 1766, based his *Tringa pusilla*, which name being the first applied to the bird in the binomial system, has priority over all others, and must be employed. In 1811, at the time of the founding of the genus *Ereunetes*, of Illiger, that author named the bird *E. petrificatus*. Cassin, in the General Report, though admitting that *T. pusilla*, Linn., is really this species, does not change Illiger's specific appellation, concerning which all doubt is removed by the actual examination of the type specimen. Very recently, however, in the Proceedings of the Philadelphia Academy, he has given the bird as *Ereunetes pusillus*, Cass., the name by which it should be known. In 1813 Wilson named the bird *T. semipalmata*, which designation being a most appropriate one, has been in general use among modern ornithologists, though referred by different authors successively to *Tringa*, *Heteropoda* and *Ereunetes*. The *Pelidna Brissoni*, of Lesson, who quotes *T. pusilla*, Linn., is probably the present bird.

The remarkable variations in size and in the depth of the bill to which this bird is subject, have given rise to several nominal species. The *Hemipalama*

largest and smallest of these, amounts to nearly two-tenths of an inch; and in length of bill to about *four-tenths*, the latter being more than half the entire length of the shorter bill. The shortest bills appear fully as stout as the longest. These differences do not seem to depend upon locality, being found in specimens from the same region, while specimens from widely separated localities are absolutely identical. Thus, an excessively short-billed bird from Maryland is identical with one from Nebraska, while very large and long-billed specimens from Georgia, Utah and the Pacific coast do not differ appreciably. Specimens, however, from the same locality, and undoubtedly of the same species, exhibit much variation in size, length of bill and tarsus, amount of red or white above, and character of the spots beneath; so that without a full series of the common Atlantic bird before me, and especially in the uncertainty, if two or more species be admitted, to which one the name *pusilla* belongs, I have preferred to consider them as specifically identical. Still, it would not be surprising if a careful and extended examination of a large series of *Ereunetes* from all localities on the continent should substantiate two or even three good species: *Tringa semipalmata*, of Wilson, *Hemipalama minor*, of Gundlach, and *Heteropoda mauri*, of Bonaparte.

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*minor* of Gundlach is founded upon shortness of bill as a character ; as is also (fide Gen. Rep.) the *Tringa brevirostris* of Spix. By the same authority the *Heteropoda mauri* of Bonaparte is considered as merely a larger race of the present species.

## TRINGA Linnæus.

*Tringa*, Linnæus, Syst. Nat. 1735. Typus *T. canutus*, L. (fide G. R. Gray.)

*Calidris*, Cuvier, Regne An. 1817. Typus *T. canutus*, L. (Nec. Cuv. 1800, *cujus typus T. arenaria*, i. fide G. R. Gray.)

*Canutus*, Brehm, 1830, (fide G. R. Gray.)

*Char.*—Bill about as long as, or rather longer than, the head, straight, stout, somewhat compressed, widening uniformly from the middle to the slightly expanded, rather hard tip; the culmen depressed on the terminal half to the expansion at tip, and obsolete furrowed. Both mandibles deeply grooved to the tip. Nostrils very large and placed far forward in the upper groove. Feathers extending on the lower mandible much further than on the upper, and nearly as far as those between the rami. Wings long, pointed, first primary decidedly longest. Secondaries moderately incised. Tertials short, broad, and comparatively stiff. Tail rather short, nearly even, the central feathers projecting but little if any. Legs short and very stout; tarsus usually shorter than the bill; longer than the middle toe. Tibial feathers reaching nearly to joint; tibiæ bare for nearly two-thirds the tarsus. Toes very short and stout, free at base, widely margined; outer lateral longer than inner. Hind toe present, well developed. Claws short, stout, blunt, much curved, dilated on the inner edge. Size large, general form stout.

In the above diagnosis I have drawn the characters of the genus so as to include only the type (*canutus*) upon which it was founded. In this acceptation it may be considered as typical of the section, embodying as it does the most characteristic features of the group, and presenting their usual variations; very great in plumage and in the length of the bill, and slight in the proportions of the legs and shape of the wings and tail. The essential characters lie in the stout, moderately long, straight bill, which usually considerably exceeds the tarsus, which latter is much longer than the very short stout toes; the long tibial feathers, long pointed wings, and short nearly even tail. The peculiar proportions of bill and legs is shared by no other Sandpiper, so far as my knowledge extends, except *Calidris*, which is evidently closely allied. This genus, however, is at once distinguished by the marked character of the absence of the hind toe. The affinities of *Ereunetes* have already been adverted to. *Arquatella* presents the next closest relationship, but is well characterized by the extremely abbreviated tarsus, rounded tail, and some other features.

*Tringa* is among the oldest of genera, having been established by Linnæus in 1735. As usual with old Linnæan genera, it has been used with great latitude, all the species which now compose the section having been included in it. It seems, however, to represent a form from which all others are sufficiently different to require full generic rank. Its synonyms are (fide G. R. Gray) *Calidris* of Cuvier, 1800, (not of 1817, of which the type is *T. arenaria*, L.,) and *Canutus* of Brehm, 1830.

North America possesses but a single representative of the genus as restricted. The *Tringa Cooperi* of Baird, which has been referred to it, seems to fall more naturally under *Actodromas*. Its relationships will be found fully discussed under that head.

## TRINGA CANUTUS Linnæus.—Red-breasted Sandpiper.

*Tringa canutus*, Linnæus, Syst. Nat. i. 1766, 251. Latham, Ind. Orn. 1790, ii. 738. Pennant, Arct. Zool. 1785, ii. 473. Gmelin, Syst. Nat. 1788. Pallas, Zoog. Rosso-As. 1811, ii. 197. Temminck, Man. d'Orn. 1820, ii. 627. 1861.]

- Jenyns, Manual, 1835, 213. Bonaparte, Comp. List, 1838, 49. Schinz, Europ. Faun. 1840, i. 326. Macgillivray, Man. Brit. Orn. 1842, ii. 67, Dekay, N. Y. F. 1844, 243, tab. 85, fig. 194, et. tab. 97, fig. 218. Schlegel, Rev. Crit. 1844, 88. Gray, Genera, 1849, iii. 579. Degland, Orn. Eur. 1849, ii. 219. Bonaparte, Rev. Crit. 1850, 185. Parzudaki, Cat. Ois. Eur. 1859, 14. Meyer, Brit. Birds, 1857, v. 67. Cassin, Gen. Rep. 1858, 715.
- Tringa ferruginca*, Brunnich, Orn. Bor. 1764, 53. Vieillot, Nouv. Dict. 1819, xxxiv. 466.
- Tringa cinerea*, Brunnich, Orn. Bor. 1764, 53. Latham, Ind. Orn. 1790, ii. 733. Pennant, Arct. Zool. 1785, 474. Gmelin, Syst. Nat. 1788, i. pars ii. 673. Wilson, Am. Orn. 1813, vii. 36, tab. lvii. fig. 2; id. Ord. Ed. 1829, iii. 142; id. Brewer. Ed. 1840, 482, fig. 224; ibid. Syn. 725. Lichtenstein, Verz. 1823, 72. Lesson, Man. d'Orn. 1828, ii. 283. Swainson, F. B. A. 1831, ii. 387. Nuttall, Man. Orn. 1834, ii. 125.
- ?*Tringa australis*, Gmelin, Syst. Nat. 1788, i. pars ii. 679. Latham, Ind. Orn. 1790, ii. 737.
- Tringa naevia*, Gmelin, Syst. Nat. 1788, i. pars ii. 681. Latham, Ind. Orn. 1790, ii. 732. Pennant, Arct. Zool. 1785, ii. 480.
- Tringa grisea*, Gmelin, Syst. Nat. 1788, i. pars. ii. 681. Latham, Ind. Orn. 1790, ii. 733.
- Tringa islandica*, Gmelin, Syst. Nat. 1788, i. pars. ii. 682. Latham, Ind. Orn. 1790, ii. 737. Pennant, Arct. Zool. 1785, ii. 476. Audubon, Orn. Biog. 1838, iv. 130, tab. 315; id. Syn. 1839, 232; id. Birds Amer. 1842, v. 254, tab. 328. Giraud, Birds L. I. 1844, 224. Holboll, Fauna Grœn. 1846, 38. Nilsson, Scand. Faun. 1858, ii. 252.
- Tringa rufa*, Wilson, Am. Orn. 1813, vii. 43, tab. lvii. fig. 5; id. Ord. Ed. 1829, iii. 140; id. Brew. Ed. 1840, 487, fig. 227; ibid. Syn. 725.
- Tringa (Tringa) canutus*, Bonaparte, Cat. Met. 1842, 61.
- Tringa (Tringa) islandica*, Bonaparte, Speech. Comp. 1827, 62.
- Tringa (Tringa) rufa*, Bonaparte, Obs. Wils. 1825, 93.

*Sp. Char.*—Largest of North American *Tringæ*. Bill stout, straight, rather longer than the head, upper mandible widely and deeply grooved to the expansion at tip. Feathers extending on lower mandible much farther than on upper, and nearly as far as those between the rami. First primary decidedly longest; tail short, nearly even; legs short, stout; tarsus usually shorter than the bill, but much exceeding the middle toe. *Adult in spring.* Upper parts brownish-black, each feather broadly tipped and edged with ashy white, tinged with reddish yellow on the scapulars. Rump dark ash, transversely banded with dusky; upper tail coverts white, with transverse sagittate or crescentic bars of brownish black. Tail greyish ash, edged with ashy white. Outer webs and tips of primaries deep dusky, the inner much lighter. Secondaries and coverts greyish ash, broadly edged and tipped with ashy white. Line over the eye and entire under parts a uniform deep brownish-red, fading into white on the sides posteriorly and the under tail coverts, which latter are marked with sagittate spots of dusky. Legs and feet greenish black. *Young in autumn.* Upper parts a uniform dark ash, or cinereous, each feather tipped with ashy or pure white, and having a sub-terminal edging of dusky black. Indistinct line over the eye, and whole under parts white, more or less tinged with light reddish, and the throat, breast and sides with rather sparse, irregularly disposed lines and spots of dusky, which become transverse waved bars on the latter.

Length 10·5, extent 20·5, wing 6·4, tail 2·7. Bill about 1·4, tarsus 1·2, middle toe 1 inch. Tibia bare ·6.

*Habitat.*—Atlantic coast of North America; Europe.

This is the largest of the Sandpipers, and, though exceeding all others in the variation of plumage to which it is subject, may yet be easily recognized in all stages by its generic characters, which differ in some marked particulars from those of any other bird of the section. In the above diagnosis are given the

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plumage of the adult and of the young of the first autumn. These represent the two extremes; but birds may be found of every intermediate stage. In respect to form, the bird varies chiefly in the length of the bill and shape of the tail. The bill in adult specimens is always longer than the tarsus, but being dependent somewhat on age, may in young birds be found equal to the tarsus, or even a little shorter. The tail, usually nearly or quite even, is sometimes in immature birds considerably doubly emarginate; the central feathers, however, are never pointed and projecting as in *Actodromas*. As usual among the *Tringæ*, the tarsus and toes do not differ much in length or proportions.

*Tringa canutus* is mentioned in the very earliest ornithological writings, and, as is usually the case with those species which vary much in plumage, has received a great variety of names. The older authors instituted nominal species on almost every change of plumage which it undergoes; but still, these stages are now so well known, that there is little difficulty in identifying the descriptions. The "grisdled" and "freckled" sandpipers of Latham and Gmelin, *T. grisea* and *navia*, as well as, in all probability, the *T. australis*, Gm., are to be referred to intermediate stages of the present bird. But it is the plumage of the first autumn which has given rise to the most firmly established nominal species, the *T. cinerea*, Auct.; it is as different as possible from that of the adult, and at the same time is marked in character and presents but few evidences of immaturity. It is not a little singular that as late as 1813 Wilson should give the bird a new name, (*T. rufa*), and say that "of this prettily-marked species I can find no description;" there being already at that date no less than seven different appellations for the bird. *Tringa canutus* of Linnæus seems to have priority over all others, and is the name now in general use.

#### CALIDRIS Cuvier.

*Calidris*, Cuvier, 1799—1800, (fide G. R. Gray;) 1805, (fide Gen. Rep.) Nec

*Calidris*, Cuv. Regn. An. 1817.

*Arenaria*, Meyer, 1810, (fide G. R. Gray.) Nec Linnæi.

*Char.*—Bill stout, straight, about equal to the head or tarsus; tip thickened, expanded and rather hard, the culmen just posterior to it somewhat depressed and hollowed. Nostrils situated far forward. Wings long, pointed; tail short, doubly emarginate, central feathers projecting. Tibia bare for two-thirds the length of the tarsus; toes very short and widely margined. Hind toe wanting. (General characters of *Tringa* proper, but without hind toe.)

A genus well marked by the absence of the hind toe, a feature entirely peculiar among *Tringæ*. In other respects it comes nearest to *Tringa* proper, with which it has a very close affinity, the bill, tarsus and toes, as well as the tibia, having much the same proportions. The toes, however, are even shorter, and the tail is doubly emarginate, a feature scarcely seen in *Tringa*. The bill in its short and stout proportions has much the general appearance of that of *Charadrius*, which fact, in connection with absence of the hind toe, has caused the single species of the genus to be referred to the plovers by some of the older authors. In all other respects, however, as well as in general habits, the bird is a true Sandpiper.

According to Gray, *Calidris* of Cuvier, of 1799—1800, is founded upon the *T. arenaria*, L. The name must therefore be employed in the present connection, though in 1817 Cuvier gives *T. canutus*, L. as the type of the genus. *Arenaria* of Meyer, of 1810, based, according to Gray, upon the *T. arenaria*, is preoccupied in Botany, that being the name of an old Linnæan genus of plants.

#### CALIDRIS ARENARIA Illiger.—Sauderling.

*Tringa arenaria*, Linnæus, Syst. Nat. 1766, i. 251. Audubon, Orn. Biog. 1839, iii. 231, v. 582; id. Syn. 1839, 237; id. Birds Amer. 1842, v. 287, tab. 338. Schlegel, Rev. Crit. 1846, 90.

1861.]

*Trynna tridactyla*, Pallas, Zoog. Rosso-As. 1811, ii. 198.

*Charadrius calidris*, Linnaeus, Syst. Nat. 1766, i. 255. Wilson, Am. Orn. 1813, vii. 68, tab. lix. fig. 4; id. Ord. Ed. 1829, iii. 167; id. Brew. Ed. 1840, 503.

*Charadrius rubidus*, Gmelin, Syst. Nat. 1788, i. 688. Wilson, Am. Orn. 1813, vii. 129, tab. lxiii. fig. 3; id. Ord. Ed. 1829, iii. 170; id. Brewer. Ed. 1840, 541.

*Arenaria vulgaris*, Leisler, (fide G. R. Gray)

*Arenaria calidris*, Meyer, (fide G. R. Gray.) Degland, Ornith. Europ. 1849, ii. 240. Lamheye, Av. Cuhal. 1850, 100.

*Calidris arenaria*, Illiger, Prod. 1811, 249. Temminck, Manual, ii. 524. Lichtenstein, Verz. 1823, 72. Bonaparte, Ohs. Wilson, 1825, v. 105. Swainson, F. B. A. 1831, ii. 366. Nuttall, Manual, 1834, 4. Jenyus, Manual, 1835, 183. Schinz, Eur. Faun. 1840, i. 298. Bonaparte, Comp. List. 1838, 50; id. Catal. Metod. 1842, 61. Macgillivray, Man. Brit. Orn. 1842, 65. Giraud, Birds L. I. 1844, 243. Gray, Genera, 1849, iii. 581. Bonaparte, Revue Crit. 1850, 184. Cassin, U. S. Ast. Exp. 1855, ii. 194; id. Gen. Rep. 1858, 723. Nilsson, Scand. Faun. 1858, ii. 255. Cooper et Suckley, Nat. Hist. Wash. Terr. 1860, 241.

*Calidris tringoides*, Vieillot, Gal. Ois. 1834, ii. 95, tab. ccxxxiv.

*Calidris Americana*, Brehm, Vog. Deut. 1831, 675, (fide Gen. Rep.)

*Sp. Char.*—Bill short, stout, straight, the tip much thickened and expanded. Upper mandible widely, lower narrowly but distinctly, grooved. First primary decidedly longest. Tail doubly emarginate, the central feathers pointed and much projecting. Legs moderate, toes very short and widely margined. *Adult in spring.* Entire upper parts and neck all round, variegated with black, light ashy and bright reddish; on the hack and scapulars each feather having a central black field, and being broadly margined and tipped with ashy or reddish. Under parts white, immaculate. Outer webs and tips of primaries deep brownish black, inner light ashy. A white spot at base of inner primaries. Secondaries mostly pure white; the outer vanes and part of inner on the latter half dusky. Greater coverts dusky, broadly tipped and narrowly edged with pure white. Rump, upper tail coverts and central tail feathers dusky, tipped and narrowly edged with ashy white; lateral tail feathers very light ash, nearly white. Legs and feet black. *Young in autumn.* No traces of the reddish. Upper parts very light ash, each feather fading into white on the edges, and with a narrow shaft line of dusky. Entire under parts pure white. Scapulars dusky, edged with whitish. Other parts as in the adult.

Length 7.5 to 8, extent 15 to 16; wing 4.9, tail 2.25. Bill about 1 inch, tarsus rather less; middle toe .75.

*Habitat.*—Temperate North America; South America; Europe.

In the above diagnosis I have given the breeding plumage and that of the young the first autumn; but a more usual winter dress differs from either. There are traces of the reddish on the upper parts generally and on the breast. Each feather above is brownish-black, regularly indented and tipped with ashy white, thus giving to the upper parts the appearance of being evenly mottled. There is a buff tinge on the breast, and also on the tips of the rump feathers. The bend of the wing is nearly as dark as in the adult. At all times the under parts of the bird from the jugulum are pure white.

As stated in the remarks upon the genus, the peculiarities of the form of this bird have caused it to be considered as a *Charadrius* by some of the older authors. Linnaeus erred so much as to refer it to that genus in one state of plumage, and to classify it as a Sandpiper in another. Wilson, though retaining the species in *Charadrius*, remarks upon its evident affinity to the latter group. The *Charadrius rubidus* of Gmelin and Wilson represents the adult-breeding plumage, and the *C. calidris* of the same authors, the young bird. But the peculiarities of the bird are so great that it was very early removed from

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both *Tringa* and *Charadrius*, and a genus *Calidris* formed for its reception. In 1811, Illiger called the bird *C. arenaria*, which is the name generally employed by ornithologists since that date. Audubon, however, in all his works retains the species in *Tringa*. I have found but two instances of the use of *Arenaria calidris*, Mey., which are those given in the list of synonyms. *Calidris tringoides* of Vieillot is undoubtedly the present bird, as is also (fide Gen. Rep.) the *C. Americana* of Brehm.

## ARQUATELLA Baird.

*Arquatella*, Baird, Gen. Rep. 1858, 714. Typus *Tringa maritima*, Brünn.

*Char.*—Bill variable, always longer than the head, straight or slightly decurved, very slender, much compressed, tip scarcely expanded. Groove in lower mandible shallow, sometimes nearly obsolete. Wings long, pointed. Tail moderate, cuneiform. Tibial feathers very long, covering the joint. Tarsus extremely abbreviated, much shorter than the bill or middle toe. Toes very long, broadly margined and flattened beneath. Hind toe very short; claws short and blunt.

In the remarkably abbreviated tarsus, much surpassed by the long toes,—in the lengthened tibial feathers, cuneiform tail and slender compressed bill,—*Arquatella* constitutes perhaps the most marked section of the *Tringee*, and one well worthy of full generic rank. Indeed it is a little remarkable that it was not earlier separated from the other allied genera. By most authors it has been considered as a true *Tringa*, and placed in close connection with *T. canutus*. Bonaparte, however, gives it as a *Pelidna*, though Cuvier, in establishing that genus, retains it in his *Calidris*, (of 1817 = *Tringa* proper.) Besides its striking peculiarities of form, the colors of the single species is very different from that of any other known Sandpiper. The name *Arquatella* is Pallas's specific appellation of the bird.

## ARQUATELLA MARITIMA (Brünn.) Baird.—Purple Sandpiper.

*Tringa maritima*, Brünnich, Orn. Bor. 1764, 54. Gmelin, Syst. Nat. 1788, i. pars ii. 678. Latham, Ind. Orn. 1796, ii. 731. Pennant, Arct. Zool. 1785, 481. Vieillot, Nouv. Dict. 1819, xxxiv. 471. Temminck, Manual, 1820, ii. 619. Lesson, Manual, 1828, ii. 283. Swainson, F. B. A. 1831, ii. 382. Nuttall, Manual, 1834, ii. 115. Jenyns, Manual, 1835, 211. Audubon, Orn. Biog. 1835, iii. 558, tab. 284; id. Syn. 1839, 233; id. Birds Am. 1842, v. 261, tab. 330. Macgillivray, Man. Brit. Birds. 1842, ii. 67. Schinz, Eur. Faun. 1840, i. 324. Schlegel, Rev. Crit. 1844, 88. Giraud, Birds L. I. 1844, 236. DeKay, N. Y. Fauna, 1844, ii. 237, tab. 87, fig. 98. Hollbol, Fauna Green. 1846, 39. Degland, Orn. Eur. 1849, ii. 222. Gray, Genera, 1849, iii. 579. Parzudaki, Cat. Ois. Eur. 1856, 14. Meyer, Brit. Birds. v. 1857, 80. Nilsson, Scand. Faun. 1858, ii. 235.

*Pelidna maritima*, Bonaparte, Comp. List, 1838, 49; id. Rev. Crit. 1850, 185; id. Cat. Met. 1842, 60.

?*Tringa striata*, Linnæus, Syst. Nat. 1766, i. 246. Latham, Ind. Orn. 1790, ii. 733. Pennant, Arct. Zool. 1785, ii. 472. Gmelin, Syst. Nat. 1788, i. pars ii. 672.

*Tringa undata*, Brünnich, Orn. Bor. 1764, 55. Latham, Ind. Orn. 1790, ii. 732. Gmelin, Syst. Nat. 1788, i. pars ii. 678. Vieillot, Nouv. Dict. 1819, xxxiv. 470.

*Tringa nigricans*, Montagu, Linn. Trans. 1796, iv. 40, (fide Gen. Rep.)

*Trynga arquatella*, Pallas, Zoog. Rosso-As. 1811, ii. 190.

*Tringa canadensis*, Vieillot, Nouv. Dict. 1719, xxxiv. 453.

*Tringa (Arquatella) maritima*, Cassin, Gen. Rep. 1858, 717.

*Sp. Char.*—Form and proportions typical of the genus. *Adult.* Entire upper parts a lustrous very dark bluish or blackish ash, with purple and violet 1861.]

reflections, and each feather with a lighter border. Greater and lesser wing coverts, tertials and scapulars edged and tipped with white. Secondaries mostly white. Primaries deep dusky, the shafts dull white except at tip, where they are black. Upper tail coverts and central tail feathers brownish black with purplish reflections, the outer pair of the former white barred with dusky. Lateral tail feathers light ashy. Jugulum and breast bluish ash, each feather of the latter edged with white, and the ash extending along the sides beneath the wings. Rest of under parts white, immaculate. Legs, feet and bill at base light flesh-color; rest of bill greenish black. *Young in September.* Upper parts much the color of the adult, but with each feather broadly edged and tipped with light buff or reddish yellow. Light edging of wing coverts ashy instead of pure white. Under parts everywhere thickly mottled with ashy and dusky, deepest on the breast and jugulum.

Length 8 to 9, extent 15 to 16, wing about 5, tail 2.6. Bill above (average) 1.2; tarsus .9; middle toe 1.1; tibia bare .45.

*Habitat*—Atlantic coast from Greenland to Florida. Europe.

Except in the very immature plumage given above, this Sandpiper varies but little in color, the difference between adult and young being chiefly in the depth and intensity of the tints. As the bird advances toward maturity, the upper parts become darker and more lustrous, the edgings of the wing coverts and scapulars more conspicuous and better defined. The mottling of the under parts is gradually restricted till it forms the well defined, uniform dark ash of the jugulum and breast, the sides being always sparsely streaked, and the rest of the under parts white, immaculate. The youngest specimens, however, show a very decided greenish or purplish lustre. While the length and proportions of the tibia, tarsus and toes are remarkably constant, the size of the whole bird, and more particularly that of the bill, varies greatly. The difference in the length of the bill of five specimens now before me amounts to three-tenths of an inch, and in that of the whole bird to considerably more than an inch. A specimen from Greenland is the smallest, having the wing four-tenths of an inch shorter than in one from New Hampshire. In this specimen the legs and feet are dusky-green instead of flesh-colored, and the bill is scarcely lighter at base.

Owing to the striking peculiarities of form and color which this species presents, there has been, contrary to what is usually the case with the Sandpipers known to the earlier authors, comparatively little confusion regarding it. As far as I have been able to ascertain, it has been considered as a true *Tringa* by all authors except Bonaparte (who refers it to *Pelidna*) up to the time of the General Report, in which work it is very properly made the type of a distinct genus. Most authors have also adopted the original specific appellation given by Brünnich in 1764; and I have not met with any other name in works published since 1819, in which year it is given as "*Le tringa ceudré du Canada, Tringa Canadensis*, Lath." by Vieillot. There can be no doubt with regard to the bird which is referred to under this head; for after a description which applies well to the usual immature plumage, (not that of the very young given in the diagnosis,) the author adds, "*mais ce qui distingue cet oiseau de ceux de son genre, c'est d'avoir les jambes couvertes de plumes jusqu' au talon, et même au-dessous,*"—a feature which exclusively characterizes the *A. maritima*. *Tringa undata* of Brünnich, Gmelin, &c., is considered as the young of this species in the plumage given in the diagnosis, where the light borders of the feathers of the upper parts and the transverse mottling of the lower give to the bird a somewhat wavy appearance. *Tringa striata* of Linnæus, Gmelin, &c., is generally supposed to refer to this species. Pallas gives it as *Trynga arquata*, an appellation from which the generic name is derived.

ANCYLOCHEILUS Kaup.

*Erolia*, Vieillot, Analyse, 1816, 55; Typus *Scolopax subarquata* Guld., secundum G. R. Gray et Gen. Rep. (*Erolia*, Vieill., Gal. 1834 = *Erolia*.)

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*Ancylocheilus*, Kaup, Sk. Ent. Eur. Thierw. 1839, 50; Typus *Tringa subarquata*, Temm.

*Char.*—Bill much longer than the head, slender, compressed, considerably decurved, the tip not expanded, and rather hard. Grooves in both mandibles very narrow, but distinct. Wings long, pointed. Tail very short, nearly even. Legs long, slender; tarsus and tibia both lengthened, the latter exposed for nearly or quite half the length of the former. Toes moderate, slender, slightly margined, the middle one about three-fourths the tarsus.

The essential characters of this well marked genus lie in the long, slender, decurved bill, with hard unexpanded tip, the long slender legs, and very short, nearly even tail. In addition, it may be stated that the groove in the upper mandible, except just anterior to the nostrils, is very narrow, though deep; the feathers extend between the rami scarcely further than those on the side of the lower mandible, which exceed those on the upper but little; the tip of the bill is pointed and acute; the claws are all very slender and acute. In form this genus approaches nearest to *Pelidna*, from which, however, it is perfectly distinct and easily recognizable. The bill of the latter is much stouter, depressed instead of compressed, and the feathers extend to some distance between the rami of the lower jaw. The tail is longer and deeply doubly emarginate. An important difference is to be found in the legs, in the proportion of the tibia, tarsus and toes. In *Pelidna* the toe is nearly equal to the tarsus, which is considerably more abbreviated than in *Ancylocheilus*. The tibiæ appear to be exposed to a less extent.

According to Gray and to the General Report, *Erolia* of Vieillot (Anal. 1816, ut suprâ) is founded upon the present bird. With every disposition to rely upon such authority, in a careful examination of the characters of the genus in that work and in the *Nouv. Dict.* (1817,) as well as of *Erolia* in the *Galerie*, (1834,) I have been unable to reconcile them with those of the bird now under consideration. In all these works, apparently the most important characters are stated to be the absence of the hind toe, and the presence of a membrane between the outer and middle, neither of which features exist in the *Scolopax subarquata*, Guld. In the *Galerie*, reference is made to the *Nouv. Dict.*, (x. page 409,) where the genus is fully characterized. A portion of the diagnosis is as follows:—"Erolie, *Erolia* Vieill. Genre de l'Ordre des *Echassiers*, et de la famille des *Egialites*.—trois doigts devant, *point derrière*; les extérieurs unis à la base par une membrane, l'éterne libre. Ce genre ne contient qu'une espèce qui se trouve en Afrique, et dont on ne connoit que la dépouille." It will be seen that the author places the bird ("dont on ne connoit que la dépouille") not only in a different genus, but in a family entirely distinct from the Sandpipers; and the description of "L'Erolie varié, *Erolia variegata*, Vieill., which follows, I cannot identify with any plumage of *Tringa subarquata* with which I am acquainted. It should also be borne in mind that Vieillot (*Nouv. Dict.*, ut infrâ) correctly describes the present bird under the name of "Le tringa cocorli, *T. subarquata*, Temm.," and no reference whatever is made to *Erolia*. Now, it is by no means impossible that *Erolia variegata* may have been positively identified with *T. subarquata* by actual examination of the type specimen, or otherwise; but even in that case I do not think the name should be adopted. The position of *Erolia variegata* in the system is very different from that which *Tringa subarquata* occupies, and the characters of the genus as published to the world are widely at variance with those presented by that bird.

From these considerations therefore I have adopted *Ancylocheilus* of Kaup, (1829,) concerning which there is no doubt.

ANCYLOCHEILUS SUBARQUATA (Guld.) Kaup.—Curlew Sandpiper.

*Scolopax subarquata*, Guldenstaedt, Nov. Com. Petrop. 1775, xix. 471, tab. xviii. fide Gen. Rep. Gmelin, Syst. Nat. 1788, i. 658.

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*Scolopax africanus*, Gmelin, Syst. Nat. 1788, i. 655.

*Tringa subarquata*, Temminck, Man. 1820, ii. 609. Vieillot, Nouv. Dict. xxxiv. 1819, 454. Nuttall, Man. 1834, ii. 104. Jenyns, Man. 1835, 208. Audubon, Orn. Biog. 1835, iii. 444; id. Birds Amer. 1842, v. 269, tab. 333; id. Syn. 1839. Schinz, Eur. Faun. 1840, i. 320. Macgillivray, Man. Brit. Orn. 1842, ii. 71. Giraud, Birds L. I. 1844, 237. Schlegel, Rev. Crit. 1844, 88. Dekay, N. Y. Fauna, 1844, 239, tab. 95, fig. 213. Gray, Genera, 1849, iii. 579. Degland, Orn. Eur. 1849, ii. 225. Meyer, Brit. Birds, 1857, v. 91. Nilsson, Scand. Faun. 1858, ii. 239.

*Pelidna subarquata*, Bonaparte, Comp. List, 1838, 50; id. Rev. Crit. 1850, 185.

*Ancylocheilus subarquata*, Kaup, Eur. Thierw. 1829. Parzudaki, Cat. Ois. Eur. 1856, 14.

*Numenius subarquata*, Bechstein, Nat. Deut. iv. 148, fide Temminck.

*Numenius pygmaeus*, Bechstein, Nat. Deut. iv. 135, fide Temminck.

*Numenius ferrugineus*, Meyer, fide Vieillot.

*Numenius africanus*, Latham, Ind. Orn. 1790, ii. 712.

*Erolia variegata*, Vieillot, Anal. 1816; id. Nouv. Dict. 1817, x. 409, secundum Gen. Rep. Lesson, Man. 1828, ii. 302.

*Erolia varia*, Vieillot, Gal. des Ois. 1834, ii. 89, tab. cccxxi.; (= *Erolia variegata*.)

*Falcinellus cursorius*, Temminck, fide Parzudaki.

*Tringa (Tringa) subarquata*, Bonaparte, Specch. Comp. 1827, 62.

*Pelidna (Ancylocheilus) subarquata*, Bonaparte, Cat. Met. 1842, 60.

*Tringa (Erolia) subarquata*, Cassin, Gen. Rep. 1858, 718.

*Sp. Char.*—Form typical of the genus. *Adult.* Crown of head and entire upper parts lustrous greenish black, each feather tipped and deeply indented with bright yellowish red. Wing coverts ashy brown, each feather with a shaft line of dusky and with reddish edging. Primaries deep dusky, their shafts brown at base and black at tip, the central portion nearly white. Upper tail coverts white with broad bars of dusky, and tinged at their extremity with reddish. Tail light greyish with greenish reflections. Sides of the neck and entire under parts uniform deep brownish red. Under tail coverts barred with dusky. Axillars and under wing coverts white. Bill and legs greenish black. *Young in autumn.* Crown of head and back brownish black, with a slight greenish lustre, each feather edged with white or reddish yellow. Rump plain dusky, upper tail coverts white. Wing coverts with broad greyish-white borders. Tail light ashy, edged and tipped with white, the central feathers with a subterminal dusky border in addition. Under parts entirely white, the breast and sides of the neck finely streaked with dusky, the former with a light buff tinge.

Length 8·5, wing 4·9. Bill (average) 1·5. Tarsus 1·3; toe ·9; tibia bare ·7.

*Habitat.*—"Atlantic coast of United States; rare. Europe, Asia, Africa." (Gen. Rep.)

The variations in both plumage and dimensions which this species presents are very great, fully equal to those exhibited by *Tringa canutus*. I have given above the colors of the adult and of the young of the first fall, between which there may be found every gradation, more especially in reference to the red of the under parts, which at different ages appears as mottling of greater or less extent. The species may, however, be easily recognised in every stage of plumage by its generic characters. The single American specimen before me differs from European skins in a shorter stouter bill, in a shorter tarsus and toes, and in a remarkably abbreviated hind toe.

There has been considerable confusion among writers with regard to the synonymy of this species. It has received quite a variety of both generic and specific appellations, and from its many changes of plumage several nominal species have arisen. The bird was first mentioned, in 1775, by Guldenstaedt, (Nov. Comm. ut supra,) who introduced it under the name of *Scolopax subarquata*. This specific appellation is the one which has been employed by most

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authors. It has been placed in seven different genera,—*Scolopax*, *Numenius*, *Tringa*, *Falciellus*, *Pelidna*, *Ancylocheilus* and (according to Gen. Rep.) *Erolia*. It was probably the long, slender, decurved bill which caused some of the earlier authors to consider it as a *Numenius*. The *Numenius subarquata*, Bechst., or the *Scolopax subarquata*, Gm., is the summer plumage of this species, and the *Numenius Africanus*, Lath., or the *Scolopax Africanus*, Gm., the winter. The *N. ferrugineus*, Mey. is this species, according to Vieillot; and Temminck also gives *N. pygmaeus*, Bechst. as a synonym, considering it as the young before the first moult. The "Red Sandpiper" of Latham and Pennant refers to this species, though in the synonymy the former gives *T. Islandica*, Linn. and *T. ferruginea*, Brünn., both of which names are synonyms of *T. canutus*. The relationships of *Erolia variegata* or *Erolia varia* have already been discussed under the head of *Ancylocheilus*.

#### PELIDNA Cuvier.

?? *Schœniclus*, Mæhring, Gen. Av. 1752, 77.

*Pelidna*, Cuvier, Regne Anim. 1817, 490. Typus *T. cinclus*, L.

*Char.* Bill stout, much longer than the head or tarsus, decurved, depressed, tip somewhat expanded and punctulate. Grooves in both mandibles very deep and distinct. Wings moderate; tertials long, narrow and flowing. Tail rather long, deeply doubly emarginate, the central feathers projecting. Legs moderate, or rather long. Tarsus but little if any longer than the middle toe. Bare portion of tibia more than half the tarsus. Toes rather long, and narrowly margined.

The essential characters of this genus lie in the long, stout, decurved bill, longer than the head or tarsus, and the tarsus but little longer than the middle toe, approaching in this respect to *Actodromas*, to which, in the doubly emarginate tail and, to some extent, the general pattern of coloration and changes of plumage, it is still more nearly related. Its affinities to *Ancylocheilus*, which are close, will be found discussed under that head. The genus is very variable in the length of its bill, though the legs, as usual among the *Tringæ*, are pretty constant. The colors of the two species of the group are subject to many and great variations dependent upon age and season, which in each have given rise to a second nominal species. In addition to these, minor differences in size and color have been made the grounds of specific distinction by some European writers. With these, however, the present monograph has nothing to do, since, in according to the American bird specific distinction from that of Europe, the intricate and difficult synonymy of the latter is excluded.

The genus *Pelidna*, of Cuvier, (1817), has been employed by different writers in a very unnatural manner to designate the smaller Sandpipers indiscriminately, nearly all the species having been at one time or another included in it, grouped together without the slightest regard to their natural affinities. This is perhaps due in a measure to the very loose manner in which it is characterized by Cuvier, who merely says, in instituting the genus,—“les Pelidnes ne sont que de petites maubèches, à bec un peu plus long que la tête, et dont les pieds n'ont ni bordures ni palmures.” The genus has in consequence fallen somewhat into disrepute among later ornithologists, who generally avoid the use of it; but still it must stand for the type upon which it was founded (*T. cinclus*, L.) if no other name has been previously proposed for the same group. *Schœniclus*, of Mæhring, (1752), is said by some authors to refer to that type; but I can find no characters which restrict it to the *T. cinclus*. The brief diagnosis is as follows: “Rostrum digitis cum ungue fere æquale. Pes tetradactyla. Membrana dimidium primum articulum inter extimum et medium digitum occupans.” Now as the bill is not “about equal to the middle toe and claw,” but very much longer, and as there is scarcely the rudiment of a membrane between the outer and middle toe, which does not nearly occupy “half the first joint,” the only character left which really belongs to the *T. Alpina* is “pes 1861.]

tetradactyla," which of course applies equally well to any other Sandpiper except *Calidris arenaria*.

In the uncertainty, therefore, it may be best to use *Pelidna* of Cuvier, which, although loosely characterized, is definitely located by the mentioning of the type upon which it is founded.

*PELIDNA AMERICANA* (Cass.) Coues.—American Dunlin.

*Tringa alpina*, Wilson, Am. Orn. 1813, vii. 25, tab. lvi. fig. 2; id. Ord. Ed. 1829, iii. 136; id. Brewer Ed. 1840, 475, fig. 220; (nec Linnæi, nec al. script. Europ.) Swainson, F. B. A. 1831, ii. 383. Nuttall, Manual, 1834, ii. 106. Audubon, Orn. Biog. 1835, iii. 580, tab. 290; id. Syn. 1839, 234; id. Birds Amer. 1842, v. 266, tab. 332. Girard, Birds L. I. 1844, 228. Newberry, P. R. R. Expl. 1857, vi. 100.

*Tringa (Tringa) alpina*, Bonaparte, Obs. Wils. 1825, v. 92.

*Tringa cinclus*, Wilson, Am. Orn. 1813, vii. 39, tab. lvii. fig. 3; id. Ord. Ed. 1829, iii. 138; id. Brewer, Ed. 1840, 484, fig. 225; (nec Linnæi, nec al. script. Europ.) Dekay, N. Y. Faun. 1844, 240, tab. 84, fig. 292.

*Pelidna cinclus*, Bonaparte, Comp. List, 1838, 50.

*Tringa alpina*, var. *Americana*, Cooper et Suckley, Nat. Hist. Wash. Terr. 1860, 239.

*Tringa (Schœniclus) alpina*, var. *Americana*, Cassin, Gen. Rep. 1858, 719.

*Sp. char.* Larger than *P. alpina*. Bill longer, stouter and more decurved than in the type of the genus. Wings moderate, pointed, first primary decidedly longest. Tail rather long, deeply doubly emarginate, the central feathers projecting, the upper coverts much lengthened. Legs much longer than in *P. alpina*, the tarsus decidedly longer than the middle toe. *Adult in breeding plumage.*—Crown of head and upper parts generally bright chestnut red, the feathers with a central field of black, and on the scapulars with whitish margins. Lesser wing coverts plain greyish ash, each feather with a shaft line of dusky and with a light border; greater broadly tipped with white. Outer vanes and tips of primaries deep dusky, almost black, those of the inner edged with white towards their bases; inner vanes of all light ashy. Secondaries mostly white. Tertiaries with the rump and upper tail coverts brownish black, with either plain greyish or light reddish edges, the outer pair of the latter mostly white. Central tail feathers brownish black, the rest light greyish ash. Forehead, line over the eye and whole under parts white, the jugulum with numerous longitudinal lines and streaks of brownish black, and the belly with a very broad bar of pure black. Legs, feet and bill black. *Adult in winter, and young.*—Upper parts a uniform dark ash, generally with traces of the reddish on the scapulars, and the feathers with darker shaft lines. White edgings of inner primaries very conspicuous. Jugulum with an ashy suffusion, and with numerous illly defined, blended streaks of dusky. Rest of under parts pure white.

Length 8.5, extent 14.5, wing 4.9, tail 2.3. Bill above 1.6, tarsus 1.1, middle toe .95, tibia bare, .6.

*Habitat.* Continent of North America.

Although it may seem a hazardous undertaking to separate the Dunlins of America and Europe, yet on the authority of that most accurate ornithologist, Mr. Cassin, and from the testimony of numerous specimens from both countries before me, I cannot but come to the conclusion that they are specifically distinct. The uniformly larger size, the disproportionately longer, stouter and more decurved bill, and the invariably longer and differently proportioned legs, are discrepancies which can hardly be allowed to exist in the same species. The constancy of these differences in so notoriously variable a bird as the present, as well as their radical nature, are indications which cannot be neglected. The distinctive characters being entirely those of size and proportion, the comparative measurements of three specimens from each country is subjoined:

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Name.	Length.	Extent.	Wing.	Bill.	Tarsus.	Toe.
<i>Pelidna Americana</i> .....	8.50*	15.40*	4.70	1.50	1.08	.98
“ “ .....	9.00*	14.00*	5.05	1.74	1.13	1.05
“ “ .....	8.25*		4.65	1.54	1.03	.95
<i>Pelidna alpina</i> .....	7.90†		4.25	1.40	.90	.90
“ “ .....	8.10†		4.70	1.42	1.02	.88
“ “ (“ <i>Schinzii</i> ,”)....	8.40†		4.50	1.40	.92	.85

\* Fresh; on authority of collector. † Of skin; approximate only.

The comparative diagnoses would be briefly as follows:

*P. alpina*. Length 8 inches. Bill, average, 1.4. Tarsus but little if any longer than middle toe. Length of tarsus and toe 1.75.

*P. Americana*. Larger; length 8.5 inches. Bill average 1.7; disproportionately longer, stouter, more decurved. Tarsus decidedly longer than the middle toe; legs considerably longer; length of tarsus and toe 2 inches.

Among the specimens from the west coast there appear to be two very decided types. One is that common to the Atlantic coast, in which the bill measures on an average 1.50 of an inch in length, and the wing 4.60. Of the other there are three specimens before me, collected at different times, absolutely identical in size and proportions, and differing greatly both from eastern specimens and all others from the west coast. In these the bill measures 1.72 of an inch, being nearly a fourth of an inch longer than in *P. Americana*; the wing is nearly five inches; the legs are somewhat longer, and the whole bird considerably larger. The differences, indeed, between these specimens and the average of *P. Americana* are nearly if not quite as great as those which separate that latter species from the *alpina*. These facts are of importance, and would seem to point to one of the following considerations:—either the three specimens alluded to belong to a species distinct from the *Americana*, or that they represent one extreme, and *P. alpina*, or more properly *T. Schinzii*, Brehm.,\* the other of one and the same species, of which *P. Americana* is the intermediate form. I cannot but think, however, that the former supposition is the most probable; for it seems almost impossible in one species there should be such variations, and those too of such a radical nature as are presented by specimens of *Pelidna* from different localities. Thus, to consider a bird in which the bill measures 1.20, the leg 1.75, and the wing 4.40, (as in the smallest specimen of *Pelidna* before me,) as specifically identical with one in which these parts were respectively 1.75, 2.10 and 4.95, would be almost without a parallel in ornithology; while, at the same time, if they be considered distinct, it is impossible to avoid recognizing also the intermediate form. But if, as I think has been pretty conclusively shown, the American bird is distinct from the European, then the west coast specimens above referred to are equally worthy of specific distinction.† Still, with but three specimens before me, I do not venture, in the case of so variable a bird as a Sandpiper, to present it as distinct; but should the above differences be found constant, and showing no graduation towards the *Americana*, I should have no hesitation in so doing. In the event of their proving really distinct, I would propose the name of *Pacifica* as an appropriate one.

\* With but a single specimen of *Tringa Schinzii* before me, I am not prepared to express any opinion with reference to its relationships to *Pelidna alpina*. In this paper I consider it as merely a smaller race of the latter, entirely upon the high authority of the General Report.

† In the field notes of the late Dr. C. B. R. Kennerly, I find the opinion expressed that they are distinct; and I am informed by Dr. Geo. Suckley, U. S. A., that he has always doubted the specific identity of the various specimens of *Pelidna* from the west coast. Both of these gentlemen have enjoyed excellent opportunities for observation and comparison, and their opinions should carry with them considerable weight.

The above remarks are made rather with the view of calling attention to the facts, than as presenting any solution of the problem. The whole subject is one of great interest, and well worthy of extended and careful investigation.

#### ACTODROMAS, Kaup.

*Actodromas*, Kaup, Sk. Ent. Eur. Thierw. 1829, 55; Typus *Tringa minuta*, Leisl.

*Char.* Bill about equal to the head or tarsus, short, straight, very slender, somewhat compressed, the tip punctulate, scarcely expanded, acute. Grooves on both mandibles very deep, and extending nearly to the tip. Nostrils situated very near the base of the bill. Feathers extending on the lower mandible much beyond those on the upper, and half as far as those between the rami. Wings long, pointed, first primary usually longest; tertials long, slender, flowing. Tail rather long, deeply doubly emarginate, the central feathers much projecting: upper tail coverts moderately long. Tibia bare for more than half the length of the tarsus; the feathers very short, making the exposed portion nearly as great. Tarsus equal to the middle toe. Toes long, slender, very narrowly margined, entirely free at base. (In typical species the jugulum with an ashy or brownish suffusion, thickly streaked; the rump and upper tail coverts with a central blackish field.)

The genus *Actodromas*, of Kaup (1829) includes a well marked and very natural group of Sandpipers, the quite numerous species of which are very closely related both in form and colors. Its type, from which I have drawn the characters in the preceding diagnosis, is the *T. minuta*, Leisl., a European species not occurring in North America, being replaced in that country by the *Tringa Wilson* of Nuttall, a very closely allied species, and one with which it has been confounded by some authors. The essential characters of the genus lie in the short, straight, slender bill, which equals the head or tarsus; the long slender toes, the middle equal to the tarsus; the much denuded tibia with its short feathers, and the long, deeply doubly emarginate tail. The peculiar proportions of bill, tarsus and toe are shared by no other Sandpipers, so far as my knowledge extends. The genus is divisible into two well-marked sections: *Actodromas* proper, with the type *T. minuta*, having its characters strictly as above; and *Heteropygia*,\* with the *Tringa Bonapartei* as type. The latter differs in the stouter bill, more expanded at tip; in the much less extent of the encroachment of the feathers on the lower mandible; in the longer legs, the tarsus rather exceeding the middle toe; in the entire absence of the brownish or ashy suffusion on the jugulum, and in the white upper tail covers. In this section I have placed the *Tringa Cooperi* of Baird, which is most closely related to the *A. Bonapartei*, and is at any rate an *Actodromas* rather than a true *Tringa*.

The species of the genus now ascertained to inhabit North America are five in number: *A. maculata*, *A. minutilla*, and the new *A. Bairdii*, coming under *Actodromas* proper; *A. Bonapartei* and *A. Cooperi*, which compose the section *Heteropygia*. The three first of these are so nearly alike in colors, that, their form being absolutely identical, size is the chief specific difference. *A. maculata* is much the largest, being about nine inches in length; *A. minutilla* is very small, being less than six inches; while *A. Bairdii* is exactly intermediate between the two, measuring a little over seven inches.

The following brief schedule will serve to distinguish the five species, when in adult breeding plumage:—

#### *Actodromas*, Kaup.

A. Jugulum with a brownish or ashy suffusion, thickly streaked. Rump and upper tail coverts with a central black field.

\* The name is used with reference to the most conspicuous, though probably not most important, feature in which it differs from *Actodromas* proper. The combination being rather an obvious one, the name may have been already employed; in that event I would suggest *Delopygia* with much the same signification.

1. Much the largest; length about 9 inches, wing (average) 5.25. Crown much darker than the hind neck, the transition abrupt. Chin immaculate. Edgings of feathers on upper parts light chestnut-red, not making indentations towards the shaft. Suffusion on jugulum very deep, the streaks narrow, distinct. Central tail feathers long, pointed, much projecting. Bill and legs dusky green, *maculata.*
2. Smaller; length 7.25 inches, wing 4.8. Crown not conspicuously darker than hind neck. Edgings of feathers on upper parts light reddish yellow, scarcely brighter on the scapulars, making indentations towards the shaft. Suffusion on jugulum very light, the markings rounded, somewhat obsolete. Central tail feathers rounded, less projecting. Bill and legs black, *Bairdii.*
3. Much the smallest; a miniature of the preceding; length 5.75; wing 3.4. Edges of feathers chestnut-red, usually more or less indented, tips lighter. Bill black, legs dusky green, *minutilla.*

*Heteropygia*, Coues.

- B. Jugulum without an ashy or brownish suffusion. Upper tail coverts white.
4. Length 7.5. Jugulum thickly streaked with rather narrow lines. Upper tail coverts immaculate, except the outer pair. Central tail feathers nearly black, considerably projecting, *Bonapartei.*
  5. Much larger; length 9.5. Jugulum with sparse, rather broad oval spots or streaks. Upper tail coverts with sagittate spots of dusky. Central tail feathers scarcely darker than the lateral, projecting but little, *Cooperi.*

*Comparative Measurements of Species.*

Name.	Sex.	Length.	Extent.	Wing.	Bill above.	Tarsus	Middle Toe.	Outer Toe.	Coverts to end of tail.	Central Feathers project.
<i>A. maculata.</i>		9.00*		5.35	1.12	1.12	1.12	.90	.80	.52
do.	♀	8.50	16.50	5.00	1.15	1.10	1.12	.92	.80	.40
do.		9.10	18.20	5.55	1.20	1.14	1.14	.92	.90	.42
<i>A. Bairdii.</i>		7.15		4.90	.85	.83	.83	.70	.60	.20
do.		7.25	15.25	4.85	.86	.88	.88	.72	.50	.15
do.		7.25	15.25	4.80	.86	.90	.82	.69	.63	.16
<i>A. minutilla.</i>				3.35	.74	.69	.78	.61	.45	.18
do.		6.00	11.30	3.35	.72	.75	.79	.64	.40	.25
do.		6.00	12.00	3.56	.74	.75	.85	.66	.58	.20
<i>A. Bonapartei.</i>		7.40	15.00	4.70	.94	.98	.95	.80	.80	.29
do.				4.85	.88	.98	.90	.80	.80	.22
do.		7.40	15.10	4.80	.95	.92	.91	.75	.75	.22
<i>A. Cooperi.</i>		9.50		5.75	1.23	1.14	1.08	.95	.85	.15

ACTODROMAS (ACTODROMAS) MINUTILLA (Vicill.) Coues.—Least Sandpiper.

*Tringa minutilla*, Vieillot, Nouv. Dict. 1819, xxxiv. 452, (haud dubie.) "Vieill." Gray, Genera, 1849, iii. 579.

*Tringa pusilla*, Wilson, Am. Orn. 1813, v. 32, tab. xxxvii. fig. 4; id. Ord. Ed. 1829, iii. 134; id. Brewer, Ed. 1840, 347, fig. 161. (Nec Linnæi; nec Meyer; nec Bechst.) Swainson, F. B. A. 1831, ii. 386. Audubon, Orn. Biog. 1838, iv. 320, tab. 180; id. Syn. 1839, 237; id. Birds Amer. v. 1842,

\*The measurements of the length and extent are from the fresh bird, and on the authority of the collector.

280, tab. 337; Giraud, Birds L. I. 1844, 240. Gray, Genera, 1849, iii. 579. Woodhouse, Expl. Zuni. 1853, 100.

*Pelidna pusilla*, Bonaparte, Comp. List, 1838, 50. Gosse, Birds Jamaica, 1847, 348.

*Tringa Wilsoni*, Nuttall, Man. 1834, ii. 121. Cooper et Suckley, Nat. Hist. Wash. Terr. 1860, 240.

*Tringa (Tringa) pusilla*, Bonaparte, Comp. Specch. 1827, 237.

*Tringa (Actodromas) Wilsoni*, Cassin, Gen. Rep. 1858, 721.

*Sp. Char.*—The smallest of North American *Tringæ*. Bill straight, very slender, about equal to the tarsus, but varying somewhat, the tip scarcely expanded, and the point very acute. Wings long, first and second primaries about equal, third but little shorter. Tertiaries very long, frequently nearly equalling the primaries. Tail rather long, the central feathers moderately projecting and rather rounded. Middle toe frequently slightly longer than tarsus. Upper parts generally with each feather having a central black field, and being edged with chestnut and tipped with ashy white, the margins making a deep indentation in the middle of the feather. Outer row of tail coverts white, with large, sagittate, dusky spots. Central tail feathers black, edged with light reddish, the others very light ashy with whitish borders. Primaries deep dusky, almost black, the shaft of the first white. Secondaries and greater coverts dusky, lighter on the inner vanes, and tipped with white. An indistinct whitish line over the eye, and a dusky one between the eye and bill. Jugulum and sides to some distance with a very decided brownish suffusion, and thickly marked with rounded spots and streaks of dusky. Chin and under parts generally white, the former usually with minute points of dusky. Legs, feet and bill greenish dusky, the latter nearly black.

Length 5.5 to 6, extent 11.5 to 12, wing 3.4. Bill, tarsus and middle toe about .75.

*Habitat.*—Entire temperate North America.

The diminutive size of the present species at once distinguishes it from any other Sandpiper now recognised as an inhabitant of North America; but in view of the species of other countries with which it is very closely allied, and especially of the uncertainty whether there be not two or more distinct species in North America, a more minute description may not be considered as unnecessary. In addition, therefore, to the preceding diagnosis, which presents the principal characters of adult individuals, the following remarks may tend to define it with more precision.

In apparently adult specimens, the general style of coloration much more closely resembles that of *Bairdii* than of *maculata*, in the rounded black spots and color of the edgings, as well as in the scolloping at the middle of each feather. Young birds, however, are precisely similar to the *maculata* in the same stage, having the edges of the feathers bright chestnut, and the tips pure white. In this respect the species departs from the general rule with regard to young birds, the plumage at that age being actually brighter than during the breeding season. The same is the case with the *A. maculata*. An evidence of immaturity, however, may always be found in the color of the jugulum, where the wash is simply dull ashy, and the streaks narrow and ill defined. The chin, too, is immaculate, while with the adults it is usually minutely dotted with dusky. The young have the lesser wing coverts broadly margined with light reddish, while the adults have them merely a lighter shade of the color of the rest of the feather. The color of the jugulum is much that of *A. Bairdii*, being of the same decided brownish tint; and the similarity is heightened by the rounded and somewhat obsolete character of the spots. The color of the breast extends along the sides about half way to the tail, but some feathers are marked with dusky quite to the vent. The under tail coverts are usually immaculate, but sometimes have shaft lines of dusky. The primaries are deep dusky, still darker at tip, the shaft of the first being white for its entire length,

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the other having their bases and tips brownish. The secondaries and greater coverts are nearly as dark as the primaries, both conspicuously tipped and their inner vanes edged with white. The axillary feathers are white; and, in the closed wing, a portion of the under coverts form a large triangular patch of white near the shoulder.

A specimen from the west coast presents a very remarkable pattern of coloration. It has not the least trace of any reddish or chestnut, being everywhere of a uniform dark ash, each feather with a central spot or shaft line of dusky. The rump is scarcely darker than the back. The breast is merely a lighter shade of the color of the back, and the streaks are so indistinct as to be scarcely perceptible. This is very different from the plumage of the young given above; and it is not impossible that the bird is of a species distinct from the one now under consideration. The general pattern, however, is very similar to that presented by the young *Bairdii*; and in the absence of any differences of size or proportions, and with but a single specimen before me, I am unwilling to risk adding another name to the already overburdened synonymy of the smaller Sandpipers. In another specimen, also from the west coast, the prevailing color of the upper parts is almost black, the feathers, except on the scapulars, being scarcely edged with reddish; and the streaks on the breast are very numerous and dark, upon a nearly white ground. This state of plumage is exactly parallel with that sometimes exhibited by undoubted specimens of *A. maculata*.

The relationship of this species to the European *A. minuta* are close; and, with but a single very defective and immature skin of the latter before me, I cannot well state the points of difference; but all authors are agreed upon the specific distinction of the two. As far as I can judge, *A. minuta* is considerably the largest, (wing 3.85 instead of about 3.4,) and the proportions of the primaries are quite different from those of *A. minutilla*. *A. minuta* has been given as an inhabitant of North America by both Swainson and Nuttall, but probably upon insufficient or erroneous data.

With regard to this little Sandpiper, there has been considerable confusion among authors, arising partly from the great similarity it bears to some other species, such as the *Tringa minuta* and *Temminckii*, and partly from a misinterpretation of the *T. pusilla*\* of Linnæus. This name was applied by Wilson, in 1818, to the species now under consideration, and is adopted by Swainson, Audubon and some other writers. The *T. pusilla* of Nuttall ("stint or little sandpiper") is *T. Temminckii*, Leisl., and is erroneously given as an inhabitant of North America. What "Le tringa béco, *T. pusilla*, Lath." of Vieillot refers to is a little doubtful. The author quotes plate 37, fig. 4 of Wilson's Ornithology, which is *T. pusilla*, Wils. (*T. Wilsoni*, Nutt.) and also cites the "petite Alouette-de-mer de Saint-Domingue" of Brisson, which is *T. semipalmata*, Wils. (*Ereunetes pusillus*, Cass.) The description, however, especially with reference to the stout bill, traces of reddish on the under parts, &c., seems rather to point to the latter, which it may be best to consider it, even though no mention is

\* For convenience of reference, the four species to which the name *pusilla* was originally applied, with their more prominent synonyms, are here inserted.

*Tringa pusilla*, Linnæus = *Ereunetes petrificatus*, Illiger = *Tringa semipalmata*, Wilson = *Heteropoda semip.*, Nuttall, and *Hemipalama semip.*, Bonaparte = *Ereunetes pusillus*, Cassin; (*Heteropoda mauri*, Bonaparte, and *Hemipalama minor*, Gundlach, are synonymous?)

*Tringa pusilla*, Meyer = *Tringa minuta*, Leisler = *Actodromas minuta*, Kaup.

*Tringa pusilla*, Bechstein = *Tringa Temminckii*, Leisler = *Actodromas Temminckii*, Bonaparte.

*Tringa pusilla*, Wilson = *Tringa minutilla*, Vieillot = *Tringa Wilsoni* Nuttall = *Actodromas Wilsoni*, Cassin = *Actodromas minutilla* of the present article.

It will thus be seen that *Tringa pusilla* of Linnæus, Meyer, Bechstein and Wilson refers to four distinct species.

made of the webbed feet. The remarks made in this article, under the head of *Ereunetes pusillus*, will, it is hoped, show that the name *pusilla* was originally used in a very different connection, and hence cannot be employed for the present species. Bonaparte, as early as 1825, seems to have been aware that the *T. pusilla* of Linnæus was not the bird given under that name by Wilson; for in his Observations on the Nomenclature of Wilson's Ornithology, on the subject of *T. semipalmata*, Wils., he gives as a reason for not adopting *pusilla* for that latter species, that "several species have been confounded together under the name of *T. pusilla*; and although the present (*T. semipalmata*, Wils.) is the real species, it would be adding to the existing confusion to change the most appropriate name of *semipalmata*, given by the author who first separated the species, in order to apply a name generally given to another, to which in that case we ought to give a new name." In 1834, Nuttall applied the name *Wilsoni* to a species whose manners and habits he described so accurately that there can be no doubt of its referring to the bird now under consideration, though he, too, fell into the error of quoting *T. cinclus dominicensis minor*, Briss. This name *Wilsoni* being supposed to be the only one hitherto applied to the species, (except of course *pusilla*, untenable for the reason already given,) is the one in general use among more modern ornithologists. In view of the existing confusion, it is with great reluctance that I adopt still another name for this species; but the *Tringa minutilla* of Vieillot points so unmistakably to the present bird, that a strict adherence to the laws of ornithological nomenclature renders this necessary. This author (page 466 of the *Nouv. Dict.*) says: "Le nom que j'ai conservé à cet oiseau est celui sous lequel il est connu dans nos colonies d'Amérique, et qui lui a été imposé d'après sa petite taille . . . il a des rapports avec le *tringa minuta* de Leisler . . . je l'ai souvent vu à Halifax, et dans la Nouvelle-Ecosse . . . comme les tringas becots," (*T. semipalmata*, Wils.?) "se comport de même, il en est résulté qu'on les a confondus ensemble." There is no North American Sandpiper but the present remarkable for its diminutive size, and having relationships with the *T. minuta*, Leisl., that is found in Nova Scotia, except the *T. semipalmata*, Wils., with which, as the author remarks,\* it is sometimes confounded, from a general similarity in habits and appearance. The description given applies well; and in some particulars, such as the length (quatre pouces dix lignes) and the proportions of the bill, ("noir, très-grêle, et long de neuf lignes; les tarses de la même longueur,") can refer to no other North American Sandpiper.

From these considerations therefore I adopt the name *minutilla*, at least until some weightier reasons be adduced to disprove the position assumed.

ACTODROMAS (ACTODROMAS) BAIRDII COUES.—Baird's Sandpiper.

*Tringa (Actodromas) Bonapartei*, Cassin, Gen. Rep. 722. In part.

*Sp. Char.*—Form and proportions typical of the genus. Bill small, slender, rather shorter than the head, equal to the tarsus, the tip scarcely expanded, its point very acute. Grooves in both mandibles very long and deep, that of the lower very narrow. Feathers extending on the side of lower mandible much farther than those on the upper, about half as far as those between the rami. Wings long; first and second primaries about equal, but varying, third much shorter; tertiaries long, slender, flowing. Tail rather long, but slightly doubly emarginate, the central feathers rounded, projecting but little. Toes long, slender, slightly margined, the middle with its claw about equal to tarsus. *Adult in breeding plumage.* Entire upper parts a very dark brownish black, deeper on the rump and lighter on the neck behind, each feather bordered and tipped with light reddish yellow; on the scapulars the tips broader and nearly pure white, and the margins brighter, making several deep indentations towards

\* If, as is probably the case, "le beco" be the *T. semipalmata*, Wils.

the shaft. Upper tail coverts long, extending to within half an inch of the tips of the central tail feathers, black, except the outer series, which are white with dusky markings. Central tail feathers brownish black, the rest successively lighter, and all with a narrow border of white. Jugulum with a very decided light brownish suffusion, (much as in *A. maculata*,) and, together with the sides under the wings to some distance, with rounded obsolete spots and streaks of dusky. Throat and under parts generally white, immaculate. Bill, legs and feet black. *Young in August.* Dimensions and proportions as in the adult. Upper parts a nearly uniform light ashy brown, deeper on the rump, each feather with a central dark field and with a light edge. Traces of the brownish black of the adult on the scapulars. Breast and jugulum with the suffusion very light reddish brown, the streaks sparse and very indistinct.

Length 7.25, extent 15.25, wing 4.9. Bill above, tarsus and middle toe about .85.

*Habitat.*—North America, east of the Rocky Mountains. Not on the Atlantic coast. (?)

The preceding diagnosis expresses the most essential characters of a Sand-piper, hitherto confounded with the *A. Bonapartei*, but nevertheless perfectly distinct from that or any other species recognized as an inhabitant of North America. Though a true *Actodromus*, and very closely related to the *A. minutilla* and *maculata*, a similarity in size, in changes of plumage, and, to some extent, in general appearance, has caused it to be referred to *A. Bonapartei*, which, however, belongs to a group subgenerically distinct. But the two differ very materially both in tints and in the pattern of coloration of the upper parts, and in the character of the upper tail coverts and the jugulum. The following brief schedule will express the chief distinctive features of each, and render further comparison unnecessary.

*A. Bairdi.*—Length about 7.25 inches. Bill slender, entirely black. Feathers extending on the lower mandible much beyond those on the upper. Edging of scapulars light buff color, indented. Breast and jugulum with a decided brownish suffusion, the markings rounded, sparse, rather obsolete. Upper tail coverts much lengthened, black; central tail feathers projecting but little, the emargination of the tail slight.

*A. Bonapartei.*—Length about 7.50 inches. Bill stout, flesh colored at base below. Feathers extending on the lower mandible but little if any beyond those on the upper. Edging of scapulars bright chestnut, scarcely indented. Jugulum and breast with a scarcely appreciable ashy wash, the streaks narrow, numerous, well defined. Upper tail coverts moderate, white; the central tail feathers considerably projecting, and tail quite deeply emarginate.

The species is a true *Actodromas*, and belongs subgenerically to the same group as *A. minutilla* and *maculata*, with both of which it is very closely related, and requires comparison. In size it is exactly intermediate between the two, exceeding the *minutilla* by about as much as it is itself surpassed by the *maculata*. The slender black bill is very similar to that of *minutilla*, and the general pattern of coloration almost identical. The colors, however, are everywhere much lighter; the edgings of the feathers of the upper parts being of a light reddish yellow or buff, instead of the bright chestnut red of *minutilla*; while the streaks upon the breast are fewer, less distinct and more rounded. It is considerably smaller than *A. maculata*; there is nothing of the abrupt transition from the dark crown to the much lighter hind neck, so conspicuous in the latter; the tertials want the bright reddish edgings, and the pattern of coloration of the upper parts are quite different. While the suffusion of the breast and jugulum is much the same, the markings are more rounded, sparse and indistinct. There is also a great difference in the bill, as regards size, shape and color. The species differs from both *minutilla* and *maculata* in one important respect,—the character of the changes of plumage it undergoes. The young of both the former are usually quite as bright, if not brighter, than the adults;

and the markings are all definite and distinct, while immature birds of the present species are of a nearly uniform ashy above, the suffusion of the breast very light, and the streaks so indistinct as to be scarcely appreciable. In this respect it resembles *A. Bonapartei*, with the different stages of which there is a perfect parallelism. In some stages of plumage it approaches the *A. Cooperi*, the resemblance being further enhanced by the slight emargination of the tail. The greatly superior size of the latter, however, independently of its subgeneric characters, at once distinguishes it. Some specimens show a tendency towards the general dusky state of plumage also exhibited by both *minutilla* and *maculata*, when the upper parts are very dark and nearly uniform, being scarcely relieved by lighter margins of the feathers.

The following detailed description which will serve to definitely characterize this species in the plumage of the adult during the breeding season, and of the young bird of the first fall, is taken from a very perfect male shot May 19th, at Fort Resolution, and from a young male obtained in Nebraska during the latter part of July.

The bill is of moderate length, and very slender, expanded but slightly at tip, and the point very acute; the grooves are long, extending quite to the expansion of the tip, that of the lower mandible being narrow but distinct. The bill is entirely black. The feathers encroach on the lower mandible much beyond those on the upper, about half as far as those between the rami. Their upper outline is about parallel with the culmen. There is much white about the head; the extreme forehead and the lower eyelid are white, while a broad ill-defined band of the same passes over the eye. A narrow and well defined dusky stripe passes from the eye to the nostril. The crown is streaked with dusky brown and dull ochreous, and is darker along a broad medium stripe than at the sides. The sides and back of the neck are much like the crown, but rather lighter, the transition being gradual. The upper parts generally are of a dark brownish black, every feather being edged with light reddish yellow; on the scapulars each feather is broadly bordered with bright buff, still more widely at the end with a dull shade of the same, the extreme tip being white. On most of the feathers the edging makes a deep, more or less irregular indentation, leaving the black only as a line along each side of the shaft. The long tertials, the secondaries, and greater wing coverts are dusky, fading into dull white on the edges. The lesser coverts are very dark, with scarcely lighter tips. The primaries are deep dusky, almost black, the shaft of the first white, of the others mostly brownish. The inner primaries are very narrowly edged on the outer vane with white. The tail coverts are black, the outer series with sagittate spots of white. The central tail feathers which are rounded and project but little beyond the rest, are brownish black, narrowly edged with white; the lateral light ashy, fading into white at the edges. The chin and throat are white, and immaculate or nearly so. The jugulum, breast, and sides to some distance have a very decided light brownish, or ochreous suffusion, and the markings are rather sparse, rounded, and indistinct, in the middle of the breast nearly obsolete. They are largest and most conspicuous just before the bend of the wing, where they gradually pass into the stripes of the sides of the neck. The rest of the under parts including the axillars and under wing coverts are white, immaculate. The tibial feathers are ashy; the legs and feet black.

The young has the form and proportions much as in the adult. The white about the head is much restricted, and the line over the eye so illy defined as to be scarcely appreciable as such. The upper parts generally are of a dull nearly uniform brownish ash, each feather with a shaft line of dusky, and with a lighter tip. There are traces of the brownish black of the adult at intervals, but more particularly on the scapulars, where the edgings are yellowish white. The rump and upper tail coverts are nearly as dark as on the adult. The suffusion of the jugulum and breast is a very light shade of reddish brown;

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and the streaks are sparse, and so indistinct as to be in some places scarcely appreciable. The wash extends for some distance along the sides under the wings.

An intermediate, and perhaps more usual state of plumage during the winter differs in some respects from either of the preceding. The centres of the feathers of the upper parts are nearly as dark as in the adult, but they are every where rather broadly tipped with pure white. In other respects the plumage generally is much like that of the adult, except that, as might be expected, the wash on the jugulum is very light and much restricted, and the streaks very indistinct.

Upon inspection of Audubon's figure of the male of his *Tringa Schinzii*, I was inclined to think that it was taken from a specimen of the present species. It represents a male in the act of flying, and shows plainly the upper tail coverts, which are entirely dark colored, as are also the upper parts generally. In the collection, however, I find a specimen of the true *Bonapartei*, labelled "St. Augustine, Fla.," received from Mr. Audubon, which is in all probability the original of the figure. It is in the peculiar dusky state already mentioned, and agrees very nearly with the plate. His figure of the female is undoubtedly that of a true *Bonapartei*. The fact of his remarking that "In some individuals about six of the middle tail coverts are black, the lateral barred with white and dusky," show that he was acquainted with both species, but considered the differences as dependant upon sex or age. The diagnosis given by Mr. Cassin, in the General Report, of *Tringa Bonapartei*, points unmistakably to that bird; but on the examination of the four specimens there enumerated, I find three of them to be of the present species. The differences were most unaccountably overlooked by that accurate ornithologist, though on a very cursory comparison of the types of the descriptions in the present article, with specimens of *A. Bonapartei*, he pronounced them to be totally distinct.

The first specimen of the present species procured were taken by Dr. Hayden, during the exploration of Nebraska, by Lieut. Warren. There are also specimens in the collection from Fort Kearney, by Dr. Cooper, from the Zuni river, by Dr. Woodhouse, and from the vicinity of Great Slave Lake, by Mr. Kenicott and Mr. Ross. These widely separated localities would seem to indicate a habitat co-extensive with that of *A. Bonapartei*, and probably embracing the continent of North America, east of the Rocky Mountains. I have never seen it, however, from the Atlantic coast.

In presenting to the scientific world this my *first* new species, I should do violence to my feelings, did I give it any other name than the one chosen. To SPENCER F. BAIRD, I dedicate it, as a slight testimonial of respect for scientific acquirements of the highest order, and in grateful remembrance of the unvarying kindness which has rendered my almost daily intercourse a source of so great pleasure, and of the friendly encouragement to which I shall ever feel indebted for whatever progress I may hereafter make in ornithology.

ACTODROMAS (ACTODROMAS) MACULATA (Vieill.) Cass.—Pectoral Sandpiper.

*Tringa maculata*, Vieillot, Nouv. Dict. 1819, xxxiv. 465.

*Pelidna maculata*, Parzudaki, Cat. Ois. Eur. 1856, 15. (*T. Bonapartei*, Schlegel per errorem citat.)

*Tringa campestris*, Lichtenstein, Verz. 1823, 74; (nec Vieill., 1819.)

*Pelidna pectoralis*, Say, Long's Exped. 1823, i. 171. Bonaparte, Comp. List. 1838, 50. Cassin, U. S. Ast. Exp. 1855, ii. 195.

*Tringa pectoralis*, Bonaparte, Am. Orn. 1833, iv. 43; tab. xxiii.; id. Cat. Birds U. S.; id. Syn. sp. 250; (fide Bon.) Nuttall, Manual, 1834, ii. 111.

Jenyns, Manual, 1835, 210. Audubon, Orn. Biog. 1835, iii. 601; v. 582;

tab. 294; id. Syn. 1839, 232; id. Birds Amer. v. 1842, 259; tab. 329.

Macgillivray, Man. Brit. Birds, 1842, ii. 67. Giraud, Birds L. I., 1844, 233.

Decay, N. Y. Faun. 1844, 242, tab. 85, fig. 193. Schlegel, Rev. Crit. Ois.

1861.]

Eur. 1844, 89. Gray, *Genera*, 1849, iii. 579. Lambeye, *Aves Cubæ*, 1850, 98. Woodhouse, *Sitgreave's Expl.* 1853, 100. Meyer, *Brit. Birds*, 1857, v. 89. Cooper et Suckley, *Nat. Hist. Wash. Terr.* 1860, 230.

*Tringa Dominicensis*, Degland, *Orn. Eur.* 1849, ii. 232.

*Tringa (Tringa) pectoralis*, Bonaparte, *Spec. Comp.* 1827, 62.

*Tridna (Pelidna) pectoralis*, Bonaparte, *Cat. Met.* 1842, 60.

*Tringa (Actodromas) maculata*, Cassin, *Gen. Rep. Birds*, 1858.

*Sp. Ch.*—Bill a little longer than the head, about equal to the tarsus or middle toe, moderately stout, straight or very lightly decurved, the tip more expanded and punctulate than in the type of the genus. Grooves in both mandibles long and deep. Wings long, pointed, first primary decidedly longest; tertials very long, narrow, and flowing. Tarsus equal to middle toe, both about equal to the bill. Tail rather long, deeply doubly emarginate, the central feathers pointed and greatly projecting. *Adult in Spring.* An ill-defined white line over the eye, and a more distinct one of dusky between eye and bill. Crown streaked with brownish black and light chestnut, conspicuously different from the neck behind, which is streaked with dusky and light ochreous. Upper parts generally, a very dark brownish black, every feather edged with ashy or dark chestnut red, brightest on the scapulars, the tips usually lighter, and the margins never making deep indentations toward the shaft. Rump and upper tail coverts black, the outer series of the latter white, with sagittate spots of dusky. Primaries deep dusky, almost black, the shaft of the first white, of the others brown. Secondaries and greater coverts dusky, edged and tipped with white. Lesser coverts dusky, fading into light greyish ash on the edges. Central tail feathers brownish black, lighter on the edges, the lateral light ashy margined with white. Jugulum and breast with a deep wash of ashy brown, and with very numerous well defined streaks of dusky; the suffusion extending on the sides under the wings to some distance, where the dusky streaks are mostly shaft lines. Chin, and under parts generally, white, immaculate. Bill and feet dusky greenish. *Young in September.* Edges of the feathers of the upper parts generally, and of the tertials and central tail feathers, light bright chestnut, and the tips pure white. Lesser wing coverts broadly edged and tipped with light ferruginous. Suffusion on the breast and jugulum with a yellowish ochreous tinge not seen in the adult, and the streaks less distinct. Other parts as in the adult.

Length 9 to 9.5 inches, extent about 18, wing (average) 5.5. Bill, tarsus, and middle toe about 1.10.

*Habitat.*—Entire temperate North America. Europe.

This is the largest of the species of this group inhabiting North America, with the exception of the *A. Cooperi*; and though it is subject to great variations both in size and color, is not easily confounded with any other. The size, the character, and color of the margins of the feathers of the upper parts, the crown conspicuously different from the hind neck, and the deep pectoral wash, readily distinguish it. Its relationships are closest with the *A. Bairdii*, both having the black rump and upper tail coverts, and suffusion on the jugulum. The considerably superior size of the present species, however, at once distinguishes it, independently of the different color and pattern of the markings on the upper parts. In *maculata* the edgings of the feathers are either dull ashy or bright chestnut, and are never of the light reddish yellow of *Bairdii*. There is nothing of the scolloping of the edgings on the scapulars, which in *Bairdii* give the appearance of a rounded black spot on the end of each feather. The emargination of the tail is more than twice as great. The pectoral wash is much deeper, and the streaks more numerous and distinct. The much smaller size, the white upper tail coverts, and absence of a decided pectoral wash of *A. Bonapartei* at once separate that species without further comparison. The similarity in every respect except with regard to size presented by the *A. minutilla* is very great, especially in immature individuals of the latter; but its diminutive size renders

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comparison unnecessary. The differences between the present species and the *A. Cooperi* will be pointed out under the head of the latter.

In addition to the characters given on the diagnosis, the following remarks may serve to illustrate the peculiarities of the present species, with its variations. While the difference in size between the largest and smallest specimens before me is very considerable, amounting to over half an inch in the wing, and more than an inch in entire length, the bill and feet vary but little in length and proportion. The difference in the length of the bill is but about one-tenth of an inch, and of the tarsus and toes it is less. The three are about equal, and from 1.10 to 1.20 of an inch in length. The proportions of the quills seem constant, the first being decidedly longest. The tertials vary quite remarkably in length, in some specimens nearly equalling the longest primary, and in others being over an inch and a half shorter; they usually, however, reach to within less than an inch of the tips of the wings. The feathers, which encroach on the side of the lower mandible but little beyond those on the upper, present an acute angle, their upper outline being parallel with the commissure, and the lower sloping rapidly backward. The crown is much darker than the hind neck, the transition being marked and abrupt. The upper parts vary greatly in the color of the margins of the feathers, it being of every intermediate shade from a very dull ashy with scarcely a tinge of reddish to very bright chestnut. In the latter case, the tips of the feathers are nearly pure white; but this pattern of coloration is mostly confined to the young bird, which, as is also the case with *A. minutilla*, is of actually brighter colors than when adult. An evidence of immaturity is always to be seen in the light ferruginous edgings of the lesser wing coverts, which in the adults are merely light ashy. The same feature characterizes the young *minutilla*, and is also found in the European *A. minuta*. While the pectoral wash is always deep and decided, its color varies considerably. In the adults it is usually a very dark ash, while in the young of the year it has a light ochreous or buff tinge. In the former it fades gradually into the white of the chin, while on the latter it forms a well defined more or less triangular white patch. The line of demarcation on the breast is always sharply defined. In some specimens there are dusky shaft lines along the sides quite to the vent. This species also sometimes exhibits the peculiar dusky state of plumage found in the *minutilla* and *Bairdi*.

Contrary to the general rule among the Sandpipers, there has been very little confusion among authors with regard to this species, and its synonymy is definite and well ascertained. The first notice of it by an American author was in 1823, in Long's expedition to the Rocky Mountains, where it was named *Pelidna pectoralis*, by Say. This specific appellation, certainly a most appropriate one, is that which has been in general use among authors, the bird being as usual referred to both *Pelidna* and *Tringa*. It is, however, very different from either, and is in every essential a true *Actodromas*. "Le tringa maculé," *Tringa maculata* of Vieillot, (1819,) unquestionably refers to the present species, and the name has therefore priority over *pectoralis*. Lichtenstein, in 1823, named the species *T. campestris*, which of course is also superseded by *maculata* Vieill. Degland, in 1849, presented the bird as *Tringa dominicensis*, the name being derived from the *T. cinclus dominicensis* of Brisson, (1760.) This author, however, was no binomalist, and has hence no claim to bestow names in such a system.

ACTODROMAS (HETEROPYGIA) BONAPARTEI (Schl.) Cass.—Bonaparte's Sandpiper.

? *Scelopax pusilla*, Gmelin, Syst. Nat. 1788, i. 663.

*Pelidna cinclus*, var. Say, Long's Exped. 1823, i. 172.

*Tringa Schinzii*, "Brehm." Bonaparte, Syn. 1828, (nec Brehm. quæ *T. alpina*, var. ? fide Gen. Rep.) Swainson, F. B. A. 1831, ii. 384. Bonaparte, Am. Orn. 1833, iv. 69. Nuttall, Manual, 1834, ii. 109. Audubon, Orn. Biog.

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1833, iii. 529, tab. 278 ; id. Synopsis 1839, 236 ; id. Birds Amer. 1842, v. 275. Macgillivray, Man. Brit. Orn. 1842, ii. 72. Giraud, Birds L. I. 1844, 241. Dekay, N. Y. F. 1844, 241, tab. 84, fig. 191. Degland, Ornith. Europ. 1849, ii. 231. Lambeye, Aves Cuba, 1850, 98. Woodhouse, Sitgreave's Exped. 1853, 100. Meyer, Brit. Birds, 1857, v. 96.

*Pelidna Schinzü*, Bonaparte, Comp. List. 1838, 50 ; id. Cat. Met. 1842, 60.

*Tringa Bonapartei*, Schlegel, Rev. Crit. Ois. Eur. 1844, 89.

*Tringa (Actodromas) Bonapartei*, Cassin, Gen. Rep. 1858, 722.

*Sp. char.* Bill quite stout, moderately long, equal to the head or tarsus, the tip somewhat expanded. Grooves on both mandibles long and deep. Feathers extending on the lower mandible but little beyond those on the upper. Wings long, pointed, first primary decidedly longest ; tertials long, narrow and flowing. Tail moderate, quite deeply doubly emarginate, the central feathers somewhat pointed and considerably projecting. Tarsus rather longer than the middle toe. Toes long, slender and slightly margined. *Adult in breeding plumage.*—Crown and upper parts generally light brownish ash, each feather with a large field of dusky towards its end, and on the crown and middle of the back edged with light yellowish red, deepening into bright sienna on the scapulars. Lesser wing coverts dark brownish ash, fading into light ashy on the edges, and with shaft lines of blackish. Secondaries and greater coverts light greyish ash, edged and tipped with white. Tertials very dark brownish ash, fading into light ashy on the edges. Primaries deep dusky, their shafts white in the central portions, and the innermost edged with white. Rump brownish black. Upper tail coverts white, their outer series with sagittate spots of dusky. Central tail feathers deep brownish black, the rest very light greyish ash, broadly edged and tipped with white. Jugulum and breast with a scarcely appreciable wash of very light ashy, with very numerous, distinct, linear-oblong streaks of dusky brown ; these extend as minute dots nearly or quite to the bill, and as narrow shaft lines, along the sides to the vent. Rest of under parts white, immaculate. Lower mandible flesh colored for half its length ; rest of bill, with the legs and feet, black. *Young in August.*—Upper parts a nearly uniform dark ash, the black of the adults showing at intervals, but principally on the scapulars, where also the reddish margins of the feathers are apparent. Jugulum and sides under the wings with an ashy suffusion, more conspicuous than in the adult, but much more restricted, and the streaks more obsolete and indistinct. Central pair of upper tail coverts usually dusky. Other parts as in the adult.

Length 7.5, extent 15, wing 4.8 inches. Bill, tarsus and middle toe rather less than one inch.

*Habitat.*—North America, east of the Rocky Mountains. Europe.

The preceding diagnosis would characterize the species sufficiently well for all ordinary purposes ; but in view of the great confusion which exists among authors, most of whom refer it to a very different bird, a somewhat extended account of its markings and variations appears necessary. A very perfect male, in breeding plumage, from Great Slave Lake, and an immature specimen of the same sex, obtained in Labrador during the month of July, are considered as respectively representing the adult and young, and taken as standards of comparison.

*Adult.*—The bill, which is quite stout, and somewhat expanded at the tip, rather less than an inch in length, and about equal to the head or tarsus. It is pretty constant, the difference in length between the longest and shortest billed specimens before me not exceeding the tenth of an inch. The lower mandible is flesh-colored for nearly half its length. The feathers extend on the side of the lower mandible but little if any beyond those on the upper, and their encroachment between the rami is not great. There is a white stripe over the eye, and a dusky one between the eye and nostrils, but both are very ill defined. The general color of the upper parts is a light brownish ash ; but on the back the feathers have such large blackish central fields, and so conspicu-

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ously reddish margins, that the original color is seen only on the rather broad tips of the feathers. On the scapulars the reddish deepens into bright sienna, which borders the feathers evenly, showing little or no disposition towards the scolloping so conspicuous in *Bairdii* and *minutilla*. Some of the scapulars, however, are simply bordered with the prevailing ashy, and all are tipped with it. The long narrow tertials are sooty brown, fading into ashy on the edges. The secondaries and greater coverts are greyish ash, the former much the lighter, both edged and broadly tipped with pure white. The lesser coverts are dusky brown, edged with lighter. The primaries are dusky, nearly black on their outer vanes and at the tips, their shafts brownish at base, gradually fading into pure white, which again darkens with black at the tip. The innermost primaries are quite conspicuously edged with white. The rump is dark sooty brown. The upper tail coverts are white, the outer series with sagittate dusky spots. The central tail feathers are sooty black, with narrow lighter margins; the rest a very clear light ashy, margined and tipped with pure white. The under parts are white; the throat, jugulum and breast with a scarcely appreciable wash of very light ashy, and very thickly streaked with well defined, narrow, linear-oblong marks of brownish black. These streaks, reduced to their minimum, extend as minute points nearly or quite to the bill, and, chiefly as narrow shaft lines, extend along the sides under the wings to the tail coverts, the dusky spots on the upper being the continuation of them. The other under parts are pure white and immaculate. The legs and feet are black.

*Young.*—The young differs very materially from the adult. The upper parts generally are of a nearly uniform dark greyish ash, the feathers with scarcely lighter margins. The black central fields and the reddish margins soon appear at irregular intervals, giving to the upper parts a more or less variegated appearance. The reddish is seen mostly on the scapulars. The wings and wing coverts are exactly like those of the adults, in this respect showing a remarkable deviation from the usual rule among the species of this genus, where an evidence of immaturity is to be found in the light ferruginous edgings of all the lesser wing coverts.\* The central pair of the upper tail coverts are wholly dusky, and, in addition to the sagittate spots on the outer series, the intermediate ones are sometimes marked in the same manner. The wash on the jugulum is considerably more conspicuous than in the adult, but at the same time it is much more restricted, and the streaks are fewer and very indistinct. It extends, however, along the sides much as in the adults. This state of plumage is identical with that exhibited by the *Tringa alpina* at the same age in all respects, except those of the reddish lesser wing coverts and black upper tail coverts of the latter species. Though the adults of the two species are very different, this close resemblance of the young was probably one cause of the two birds being confounded by American writers. Between the plumage of the adult and young, as characterized above, there are to be found birds of every intermediate stage. A specimen shot in the middle of August has already the markings of adult and young in nearly equal proportions, while a winter specimen agrees in almost every respect with the adult in breeding plumage described above. This species is also found in the peculiar dusky state of plumage, where all the features are very dark and scarcely relieved by ashy or reddish margins, already adverted to in the case of *Actodromas maculata*, *Bairdii* and *minutilla*. It is most probable that all the species of the genus are liable to this curious variation.

The relationships of this species are decidedly closest with the *A. Cooperi*, both having clearly the same form, and the pattern of coloration being very similar. The greatly superior size, however, of the latter, independently of the variegated upper tail coverts, different character of the spots beneath, and other

\* The same feature is seen in *Pelidna alpina* and *Americana*, a circumstance which would seem to indicate that the two genera are closely allied, as is indeed the case.

features, at once separates it without need of a more extended comparison. The larger size, pectoral wash, and black rump and upper tail coverts of *A. maculata*, at once distinguishes it, while the very diminutive proportions of *A. minutilla* render comparison equally unnecessary. Its relationships to the *A. Bairdii* have already been discussed.

It is a little extraordinary that with regard to so marked and well characterized a Sandpiper as the present, there should have arisen the confusion which until recently has prevailed among authors, nearly all referring it to a very different bird. To use the apt and expressive words of the General Report, it has been "sadly misnamed by American ornithologists." When in mature plumage it bears very little resemblance to the *Tringa Schinzii*, Brehm., which, according to the same authority, is "merely a smaller variety, or perhaps only smaller specimens of the common *Tringa alpina* —." This grave error probably originated from two causes: first, that Say, in his original description (the first notice of the bird by an American writer) designates it as *Pelidna cinclus*, var.; and secondly, that though the adults are as different as possible, the young of the two, as already stated, are nearly identical in plumage, almost the only difference lying in the proportions of the bill and feet; characters which, though important and essential, might readily be overlooked in birds of this group, in which the colors were similar. This similarity in the young and great difference between the adults of the present species and the *Tringa alpina*, var., caused Bonaparte, in his American Ornithology, to fall into a curious error. Under the head of *Tringa Schinzii*, Brehm., he describes the present species accurately, properly quoting the *Pelidna cinclus*, var. of Say; yet only the description of what he considered as the young "*T. Schinzii*" applies to the *A. Bonapartei*. For, speaking of the adult, he says: "This Sandpiper is well known to appear in a summer vesture analogous to that of *Tringa alpina*, at the same season, but we have never met with an American specimen in that state;" and further on he describes adult European specimens as having "the breast almost entirely of a jet black color," clearly referring to the so-called *Tringa Schinzii*, i. e., to the smaller variety of the *T. alpina*. Nuttall, probably following Bonaparte, commits precisely the same mistake. Audubon's *Tringa Schinzii* is undoubtedly the present species, though the measurements given are rather those of *A. Bairdii*; and, for reasons stated elsewhere, I am inclined to think that his figure of the male was taken from an individual in the peculiar abnormal dusky state of plumage already so often adverted to. The descriptions of *Tringa Schinzii* by other American authors, and by those European writers quoted in the list of synonyms, all appear to refer to the true *Bonapartei*.

The description by Schlegel, in 1844, of *Tringa Bonapartei*, unmistakably points to the present species, and, as it is the first distinctive specific appellation, must be employed. Parzudaki, in his Catalogue, very wrongly gives *Bonapartei*, Sch., as a synonym of *Pelidna maculata*, (*pectoralis* of Say.) *Scolopax pusilla* of Gmelin is in all probability the present bird, as particular mention is made of the white upper tail coverts; but from the brevity of the description, it is impossible to determine this point satisfactorily.

ACTODROMAS (HETEROPYGIA) COOPERI (Baird) Coues.—Cooper's Sandpiper.

*Tringa Cooperi*, Baird, Gen. Rep. 1858, 716.

*Sp. char.* Largest of the group. Bill considerably longer than the head, exceeding the tarsus, straight, rather stout, tip scarcely expanded. Feathers extending on side of lower mandible scarcely further than those on the upper. Wings long, pointed, first primary decidedly longest; tertials moderately long and rather slender. Tail moderate, slightly but decidedly doubly emarginate, the central feathers projecting. Tarsus rather longer than the middle toe; tibia bare for half the length of the tarsus; toes all long, slender and slightly margined. *Adult in spring*.—Upper parts a nearly uniform light greyish ash,

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each feather with a central brownish black field, deepening into pure black on the scapulars, where also the edgings of some of the feathers have a reddish tinge. Tertiaries sooty brown, fading with light ashy on the edges. Secondaries and greater coverts dark greyish ash, edged and broadly tipped with white. Primaries deep dusky, almost black on the outer vanes and at the tips, the innermost edged with white; shafts of all brown at base and black at tip, the central feathers being white. Upper tail coverts white, with sagittate spots of dusky. Tail feathers ashy brown, the central pair darkest. Under parts white; the jugulum, breast, and sides of the neck with a slight reddish tinge, and, together with the sides, with numerous streaks and oval spots of dusky, which become large and V-shaped on the flanks.

Length (of skin) 9.5 inches; wing 5.75, tail 2.80, bill above 1.23, tarsus 1.14 middle toe 1.

*Habitat*.—Long Island.

In order to exhibit more fully the features and peculiarities of this curious Sandpiper, differing in many essential respects from any other described as North American, the following additional remarks may be required, that we may be better enabled to judge of its relationships and affinities, which are matters of some uncertainty. The characters are taken from the type of the species, the original of the description in the General Report.

The bill and feet though rather stout for an *Actodromas*, are slender in comparison with *Tringa*. The tip of the former is but slightly expanded, and rather obtuse. The grooves in both mandibles are long and distinct, that of the lower being narrow but deep. The position of the nostrils is nearly intermediate between *Tringa* and *Actodromas*. The nature of the encroachment of the feathers on the bill is identical with that of *A. Bonapartei*, and very different from that of *Tringa*. The wings are long and pointed, the first primary much the longest, as in *Tringa canutus*, and the graduation of the others exactly as in that species. The tertiaries are rather long, narrow, and flowing. The emargination of the tail, though not great, is decided; the central feathers project a little beyond the others, but are not much darker than the others; the outer pair are next in length, and the third are the shortest. The legs and feet are long and comparatively slender. The tibiae are long and much denuded, the bare portion being nearly two-thirds the tarsus. The latter is rather shorter than the bill, but at the same time slightly exceeds the middle toe and claw. The toes are all long, slender and slightly margined, and the hind one is well developed. The coloration of the upper parts is very different from that of *T. canutus*, and exceedingly similar to that of *A. Bonapartei*, almost the only difference being a rather less amount of reddish on the back. The rump and upper tail coverts are much the same as in *T. canutus* being white, with sagittate spots and waved bars of dusky. The pattern, and colors of the under parts, though agreeing with *A. Bonapartei* in the absence of a decided pectoral wash, are yet very different, the spots being sparse, and extending over the whole breast, instead of being very numerous and confined strictly to the jugulum and sides. In this respect it approaches the young *Tringa canutus* or still more the adult *Ereunetes pusillus*, the similarity being heightened by the slight reddish tinge on the jugulum.

Having thus presented the chief peculiarities of this very unique Sandpiper, we are prepared to discuss the question of its affinities. Were the size and proportions of bill, tarsus, and toes the same as in the *A. Bonapartei*, it might almost be a question whether it were not an accidental variety of that species; but the discrepancies in these particulars are too great to admit the doubt. The differences from all other species are sufficiently obvious. Granting, then, that it is a distinct bird, it only remains to settle the question of its generic relationships; which, as it presents a most remarkable combination of the characters of both *Tringa* and *Actodromas*, is a matter of some uncertainty. We cannot but think, however, that all the most important characters of the bird incline

towards *Actodromas*, rather than to *Tringa*, and that *A. Bonapartei* is its nearest ally. While the actual proportions of the bill, tarsus, and toe of *Tringa* are preserved, the difference in length of the bill over the tarsus, and of the latter over the middle toe, is very trifling, and in the latter case, moreover, it is produced by a slight lengthening of the tarsus rather than by any shortening or stoutening of the toes, which are long, slender, and slightly margined as in *Actodromas* proper. The claws are all long, slender, and slightly curved, while exactly the reverse is the case with *Tringa*. The tibiæ are bare for a considerably greater extent, and the tibial feathers short. In the adults of *Tringa* these reach nearly to the joint. In the slight (though decided) double emargination of the tail, with its central feathers, but little different from the lateral, and in the pattern of the rump and upper tail coverts, there is shown a near approach to *Tringa*. The primaries are as in *Tringa*, but the elongated tertials are those of *Actodromas*. The stoutness of the bill and the position of the nostrils, are intermediate between the two, but the encroachment of the feathers is exactly that of *A. Bonapartei*. The coloration of the upper parts, except of the rump, is almost identical with that of *Bonapartei*, and that of the lower much nearer to it than to the adult *T. canutus*.

From the above considerations, especially in reference to the indications afforded by the legs, always important among the *Tringæ*, we cannot but conclude that the bird is *Actodromas*, rather than a true *Tringa*. Still we should hardly have ventured to change it from the position assigned by such high authority, had not Prof. Baird, in an attentive reëxamination of the characters of the bird, acquiesced in our views, and expressed his entire approval of the course pursued.

In view of the many peculiarities presented, it might perhaps have been advisable to consider the present bird, instead of the *A. Bonapartei* as typical of *Heteropygia*. But as the two are very closely allied, and both subgenerically distinct from *Actodromas* proper, we have preferred to give the common and well known bird as the type.

The subject of the present article, is, with a single exception, we believe, the only known specimen of this excessively rare species. It is fortunately adult, having been taken in May. The changes of plumage it undergoes, and the extent of the variation to which it is subject, cannot therefore be given. They are, however, in all probability parallel with those of *A. Bonapartei*.

"It is possible that this species may have been previously indicated under some of the names quoted as synonyms, such as *Tringa noveboracensis*, &c., although, from the brevity of the descriptions, it is impossible to determine this point satisfactorily."—(BAIRD.)

Having thus passed in review the species of *Tringæ* well ascertained to inhabit North America, it may be well to notice those attributed by authors to that country. As far as I am able to ascertain they are the following:

#### ACTODROMAS MINUTA Kaup.

*Tringa pusilla*, Meyer. (Nec Linn.; nec Bechst.; nec Wils.)

*Tringa minuta*, Leisler. Swainson, F. B. A. 1831, ii. 385. Nuttall, Manual. 1834, ii. 119.

It is not impossible that this species should occur in North America, or that there should exist a "Pigmy" Sandpiper distinct both from the *A. minutilla* and the European species. Observation, however, does not as yet warrant the belief that such is the case.

#### ACTODROMAS TEMMINCKII Bon.

*Tringa pusilla*, Bechstein. (Nec Linn.; nec Meyer; nec Wils.)

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*Tringa Temminckii*, Leisler.

*Leimonites Temminckii*, Kaup.

*Tringa pusilla*, "Linn." Nuttall, Man. ii. 1824, 117. (Nec Linn.)

This species, a specimen of which we have never had the pleasure of examining, is given by Nuttall as an inhabitant of North America, though in all probability upon insufficient or erroneous data.

LIMICOLA PYGMAEA, Koch.

*Numenius pygmaeus*, Latham.

*Tringa elorioides*, Vieillot, fide Parzudaki.

*Tringa platyrhyncha*, Temminck. Nuttall, Man. 1834, ii. 114.

This marked and very curious Sandpiper is stated by Nuttall to be "of very rare occurrence in the United States." I have never seen an American specimen, and its existence in that country must be considered as extremely doubtful.

In addition to the above, nearly all the short-billed species of *Totaniinae* were considered by the older authors as *Tringae*. *Tringa rufescens*, Vieill. of authors, though given as a *Tringa* as late as 1842, by Audubon, is in all essentials a true Tattler, and very closely related to *Actiturus*, Bonaparte.

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August 6th.

Vice President BRIDGES in the Chair.

Thirteen members present.

The death of Dr. George Spackman, a member, at Philadelphia, on the 3d inst., aged 56, was announced.

On leave granted, the Committees appointed on the papers by Messrs. Abbott, Elliott and Coues, read in July, were permitted to report, and the papers were ordered to be printed in the Proceedings for July.

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August 13th.

Dr. LEIDY in the Chair.

Nine members present.

The following papers were presented for publication :

"On three new forms of Rattlesnakes," by Robert Kennicott.

"Notes and Descriptions of Anoles," by E. D. Cope.

"Notes on the Ornithology of Labrador," by Elliott Coues.

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August 27th.

Dr. LEIDY in the Chair.

Twelve members present.

On report of the respective Committees, the following papers were ordered to be published in the Proceedings :

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## On three new forms of Rattlesnakes.

BY ROBERT KENNICOTT.

*Caudisona lepid a Kennicott.*

*Spec. char.* Head ovoid, tapering to the nose, which is very narrow, pointed and much depressed. Nostril very small, circular and placed near the point of the nose in about the middle of a single nasal. Two elongated frontals in contact, extending behind the nostrils. Superciliaries and other large plates smooth. Rostral sub-triangular, broader than high, the apex turned back slightly upon the crown. Upper pre-orbital small and separated from the post nasal by the width of two larger plates. Labials rather large, 12 above 10—12 below. Color of head yellowish ash.

Two heads of a rattlesnake from Presidio del Norte and Eagle Pass show such remarkable features as to render it justifiable to describe the species from these alone.

The head is much depressed, the general outline ovoid, tapering regularly from about opposite the angle of the mouth to the nose. The crown is remarkably smooth and the occipital scales very faintly carinated. There are two large frontals elongated laterally and posteriorly, with their inner ends in contact. They are convex on their external, and concave on their internal edges, and extend for nearly half their length back of the nostril. Behind and fitting into the emargination formed by these, are two subquadrangular and smaller plates in contact; immediately behind these is another similar pair. On each side of these two last pairs, at the edge of the crown, between the superciliaries and anterior frontals, is a larger plate. The superciliaries are rather small, and, like the other larger plates quite smooth; the space between the superciliaries is narrow, and filled with irregular rather large scales; the posterior part of the crown is also covered with rather large and smooth scales. The pre-orbitals are remarkable; the lower is, as usual, small and elongated over the pit, but the upper, very small and quadrangular, is separated from the nasal by the length of two plates, each larger than itself. In all the other species the upper pre-orbital is large, more or less elongated and in contact with the post nasal or only separated from it by the width of one smaller plate. The sub-orbital chain is complete, and there is only a single row of scales between it and the labials. The color of the head is uniform yellowish or light brownish ash without any distinct spots or stripes, though each plate is minutely mottled with brownish, and with a few scattering large black dots, and there is very faint indication of the usual posterior facial stripe extending over the angle of the mouth.

The body of this species will doubtless exhibit characters as important as those of the head. It will at once be distinguished from *C. molossus* and *C. tigris* by the single nasal, position of pre-orbitals, number and comparative size of labials, and number of rows between the sub-orbitals and labials, and by the narrow pointed nose instead of the broad blunt snout of *C. molossus* and *C. tigris*. It disagrees also with *C. lucifer* in all of the above characters, excepting the size of labials and the narrow nose, and differs widely from that species in the depressed snout, wide rostral, and perfectly smooth plates and scales on the head. By the smoothness and size of the plates, and absence of the horn, it will at once be distinguished from *C. cerastes*. It will be impossible to confound it with any of the eastern species.

*Caudisona atrox Cope. Var. Sonoraensis Kennicott.*

Specimens from Sonora and vicinity show some permanent differences from the more eastern types; and, though the differences detected as yet are thought too slight to characterize a distinct species, subsequent researches with the aid of better material will very likely prove the western type to be

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specifically different, in which event it may be named *C. Sonoraensis*. In these specimens the crown presents a decidedly smoother appearance, the plates being less corrugated and lying flat upon the crown without the up-turned edges. They are also smaller, less elongated, and more nearly sub-circular. The stripe from the posterior angle of the orbit reaches the upper labials at a point farther back than it does in the eastern specimens.

*Caudisona scutulata Kennicott.*

*Spec. char.* Resembles *C. lucifer* in form and coloration of head, and *C. atrox* in coloration of body. Head narrow, nose depressed, rostral triangular, as wide as high. Two rather small frontal plates in contact; 4 post frontals, the external large, overlying the nostril. The space between the superciliaries narrow, filled with large flat plates. Scales on the occiput large and smoother than in *C. lucifer*. Outer dorsal rows of scales less strongly carinated. Rattle remarkably slender. Dorsal rows 25. Labials 16 above, 16 below. Three rows of scales between the suborbitals and labials. Light stripe from angle of eye to angle of jaw above the labials, and another from before the eye to the labials, as in *C. lucifer*, but the rostral and space in front of the pit, and nostril not lighter than the crown. On the middle third of the body a dorsal series of distinct rhomboids, margined with whitish and with the lateral angles acute much as in *C. atrox* or *C. adamantea*; the longitudinal angles sometimes perfect, at others truncate or emarginate. Nineteen brown half rings posteriorly narrow, and separated by wider light intervals than in *C. lucifer*. Rings on the tail narrow, irregular, and quite black.

This species so closely resembles *C. lucifer* that a description of it must be comparative to some extent. The head is longer and narrower posteriorly than in *C. lucifer*, and the nose is much more depressed, the rostral being triangular and as wide as high, while in *C. lucifer* it is a third higher than than wide. There are two small sub-triangular or sub-circular frontals in contact, and behind these is a row of four scales, the outer and largest one lying directly over the nostril; posterior to these is a third row of five or six scales, connecting the anterior extremities of the superciliaries, the external scale of which row is a little in advance of the rest; behind this third row two very large scales connect the superciliaries, behind which the crown is covered with plates much larger than in *C. lucifer*. The space between the superciliaries is narrower than in *C. lucifer*. The rattle is more slender than in any other species excepting *C. cerastes*.

The markings on the body of this species are much as in *C. atrox*, and quite unlike those of *C. lucifer*. The ground color is light yellowish or brownish ash; on the middle third of the body there is a dorsal series of rhomboidal blotches more or less truncated before and behind; anteriorly they become elongated longitudinally, and not only truncated but sometimes emarginate on the longitudinal angles, while the lateral angles are rounded, leaving the blotches sub-circular. Posteriorly the dorsal blotches continue to have the lateral angles acute and perfect, till they become confluent with a lateral series, and form nineteen half rings, six of which are on the tail. In the middle third of the body the dorsal blotches are included in 11 or 12 dorsal rows and are 4 to  $4\frac{1}{2}$  scales in longitudinal extent; anteriorly they become longer longitudinally, and only 9 to 10 scales in transverse diameter. The dorsal blotches are light brown, bordered for the width of one scale with darker. They are separated along the back by a line of the ground color  $1\frac{1}{2}$  to 2 scales in width, and immediately bordered by a narrow line lighter than the ground color, as in *C. confluentus*, *atrox* and *adamanteus*, this line being about a half scale in width. Posteriorly the light intervals between the rings widen to 3 or  $3\frac{1}{2}$  scales, while the rings themselves become much narrower, being only 2 to 3 scales wide. On the middle third of the body below, and op-  
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posite to the dorsal series is another row of small rhomboidal or sometimes triangular brown blotches on each side; they involve 4 to 6 scales and extend from the second to the fifth lateral row of scales, and are bordered by light lines like the dorsal series, from which they are separated by a single scale. Indications are seen of another series of small blotches resting directly upon the abdominal scutellæ, alternating with and a little lower than the first lateral series. The abdomen is whitish yellow without distinct blotches. A light line from posterior angle of superciliary and orbit to angle of jaw above labials, and another from before the eye to labials. The markings of the head of this species seem to be very nearly the same as in *C. lucifer*, there is, however, indication of a light border to the external edge of the superciliary, and the rostral and entire space in front of the nostril and pit as well as a little posterior to these, is as dark as the crown, while in *C. lucifer* they are distinctly lighter.

Though this species so closely resembles *C. lucifer*, it will be distinguished by the dorsal rhomboids with perfect lateral angles, by the narrower and more irregular rings posteriorly, by the lighter colors generally, by the slender rattle, and by the depressed nose with the difference in the frontals, and the larger, flatter, and smoother scales behind these. From *C. atrox* it will at once be distinguished by the very different markings of the head. It differs from *C. tigris* in having the head wider behind and the muzzle narrower, position of the frontals, narrower dorsal scales, and number of rows, larger dorsal blotches, etc.

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#### Notes and Descriptions of ANOLES.

BY E. D. COPE.

Preliminary to a more extended memoir on the Anoline Iguanidæ, the following contribution is offered to Naturalists.

*Xiphosurus velifer* Gray. Inhabits the Island of Vieques.

*Xiphosurus cristatellus* Gray. Very abundant on the Island of St. Thomas.

*Anolis distichus* Cope.

Size small, form robust. Head broad, muzzle short. Tail one and a quarter times the length of the body, compressed, not verticillate, with an irregular serrate crest. Dorsal and lateral scales equal, homogeneous, minute, granular, larger than the ventral; the latter ovate, smooth. Humeral and superior antibrachial scales equal to the dorsal; those on the anterior part of the forearm larger. Anterior femoral and tibial scales equal to the ventral; those of the superior surfaces equal to the dorsal. Toes not of the most elongate type, reaching the external auricular opening or the posterior border of the orbit, where the limb is extended. No nuchal or dorsal dermal fold. Occipital plate sub-circular, rarely in contact with the superciliaries, sometimes transversely divided. Superciliaries five to seven on each side, sometimes in contact, sometimes separated by a row of minute scales. Palpebrals three to eight, smooth. Facial rugæ but little developed; interrugal space but little concave, covered with a few small, smooth scales. A straight median suture divides the plates of the anterior two-thirds of the muzzle; the latter arranged in four or five pairs, the smallest in contact with the rostral shield, the largest separated from the anterior superciliary by a large polygonal plate, and from the series of the canthus rostralis by a similar one, and in contact with it. Canthus rostralis straight, falling below the plane of the muzzle. Loreal series four. Superior labials seven. First infralabial smaller than first inferior labial or mental, its longitudinal extent greater than the transverse; the two succeeding

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similar to it—all in contact with the inferior labials. Goitre moderate. Length of head and body 1 in. 9 lin., from shoulders to vent 1 in. 2 l., tail 2 in.

Above brow, the head darker; nape and extremities faintly vermiculated; tail indistinctly spotted laterally and superiorly. Some specimens with dark shadings at the angle of the jaws, near the auricular openings, and on the sides. Goitre, vent, inferior surfaces of femora and base of tail, light yellow.

*Habitat*.—New Providence Islands. Bahamas.

This species appears to be quite distinct. It resembles in its proportions the young of *Xiphosurus cristatellus*. Specimens have been obtained by my friend Mr. H. C. Wood, Jr., and are in the Academy and Smithsonian Museums.

*Anolis striatulus Cope*.

Size small; form elongate. Head rather elongate, depressed, much as in *A. alligator Dum. Bibr.* Tail once and two-thirds the length of the body, moderately compressed, weakly verticillate, irregularly serrate. No dorsal dermal fold; an imperfect fold upon the nape, where two or three rows of scales appear to be a little larger than those upon the dorsal and lateral regions of the body. Anterior femoral and antibrachial scales large, smooth, similar to those of the belly. Superior humeral, antibrachial, femoral and tibial similar to those of the back. Occipital shield separated from the superciliaries by small scales; the latter usually in contact medially, four or five in number upon each side. Palpebral disc rather round in outline, composed of nine smooth scales. Facial rugæ weak, soon obsolete, covered by three scales anterior to the last superciliary. The space between these as far as the end of the muzzle, covered with small smooth scales. Rostral plate bordered by five scales, the median one fitting into an emargination between two mucronations. Nostrils lateral. Canthus rostralis slightly concave, very obtuse anteriorly. Superior labials eight. Loreal rows five. Anterior half of inferior labials in contact with an inferior series of plates, which are longer than broad, the anterior smaller than the first inferior labial. Goitre rather large. Two or three small plates behind the vent; scales at the base of the tail smooth. Extended posterior extremity not reaching beyond the posterior border of orbit. Total length 4 in. 7 lin.; tail 2 in. 11 lin.; head from shoulder 8 lin.

From alcoholic specimens it appears that the color is greenish gray above, with very numerous darker marblings. The head and chin are darker. The medial dorsal line is crossed by four deep brown spots bordered with white. The anterior of these, on the interscapular region, is narrow and more transverse. There is a fifth spot at the base of the tail. The latter is clouded with brown superiorly, and the extremities are cross-barred with the same. Thighs dark, variced posteriorly. Goitre red-orange, abdomen greenish, femora and vent golden.

The female (preserved in spirits) only differs in being smaller.

The Academy's Museum possesses this species from Mr. R. Swift, and the Smithsonian's from Mr. Rüse; a specimen has also been loaned me by Mr. Theodor Gill. They were all obtained in the Island of St. Thomas, W. I. The name is a diminutive of *stratus*, saddled.

*Anolis acutus* *Hallowell*, Proc. Acad. Nat. Sci. Philada, 1856, 228. The locality, "Cuba," assigned by Dr. Hallowell to this species with doubt, is probably incorrect. It has been recently sent from Santa Cruz, W. I., to the Smithsonian Institute by Mr. A. H. Rüse, and is also in the Academy's Museum. An excellent description of it has been recently published by Dr. A. Günther, in the Annals and Magazine of Natural History, 1859, p. 212, under the name of *Anolis Newtoni*. The specimens described were from Santa Cruz.

*Anolis maculatus* *Gray*, Catal. Liz. Brit. Mus. 203. The habitat not indicated. Dr. Gray's description of this species leaves much to be desired. Several of the numerous specimens of females before us so coincide with the 1861.]

same author's description of *A. lineatopus*, that we cannot avoid suspecting the latter name to be a synonym. The species is alluded to by Mr. Gosse in the Naturalist's Sojourn in Jamaica, p. 225. The identification of this, and of the *A. opalinus* of the same author, would have been much facilitated by the introduction into the description of the latter, of the characters which best distinguish species from species in this genus. The following may supply some deficiencies:

The head is rather large, and swollen round the occiput, so that the occipital plate is in a deep depression. The latter is small and separated from those of the superciliary ridges by numerous small scales. The canthus rostralis is very prominent and acute, nearly straight. There is a well marked depression between them and the facial rugæ. The latter are acute, circumscribe an oval depression containing three or four longitudinal series of keeled scales, and converge upon the muzzle before disappearing. Nine to eleven palpebrals, all keeled. The loreal rows are six; superior labials eight, inferior ten. Two anterior infralabials narrow, half the size of first inferior labials, larger than those that follow, which are in three or four rows. There is a distinct nuchal dermal fold; about six dorsal rows of faintly keeled scales, larger than the lateral. Superior brachial and pedal scales, and anterior antibrachial and femoral, strongly keeled. Tail crest slight, verticils not very marked. The hind leg extended will not reach beyond the anterior part of the orbit—often falling more or less short of it. The color that alcoholic specimens present is a pale yellowish brown, with indistinct transverse brown markings on the upper surfaces of the body, limbs and jaws. We can count five or six of these transverse bands on the side between the axilla and groin; they are here often crossed by a narrow light band proceeding from the shoulder, mostly obsolete posteriorly. Goitre unspotted, pale orange in life, according to Mr. Gosse; the toes are of the slender type. From the muzzle to the vent measures about two inches nine lines; from the latter point to the end of the tail 5 in. 5 lin.

The males of *A. opalinus* Gosse are smaller. The median dorsal rows are less noticeably larger than the lateral, and are fewer in number. The front is nearly plain, from the disappearance of the facial rugæ. The ventral plates are smooth; the superciliary plates are either in contact, or separated by one row of scales, never by two, as is usually the case in *maculatus*. In none of our specimens do the dark markings arrange themselves into transverse bands, as in the latter, and the lateral pale stripe is much more conspicuous.

In the female of *A. maculatus* the length from the muzzle to the vent is 1 in. 8 lines; the tail 3 in. The dorsal region is pale, forming a more or less distinct band; there are two narrower bands on each side, more or less interrupted, often indistinct.

Numerous specimens of this species are in the Museums of the Smithsonian Institute and Academy of Natural Sciences, which were sent to the former from Jamaica by Mr. C. B. Adams.

*Anolis iodurus* Gosse, Ann. Mag. Nat. Hist. 1850, 344. Inhabits Jamaica. The ventral plates in this species are usually smooth; they are sometimes carinate. Specimens exhibiting the latter structure have been described by Dr. Hallowell as *A. punctatissimus*, Proc. Acad. Nat. Sci. Phil. 1856, 225. This description will prove valuable to those who have to depend on that of Mr. Gosse, who gives too few of the essential characters for it to be readily recognized. The *A. heterolepis* of Dr. Hallowell, op. cit. p. 230, is the female, the locality "Cuba" being probably erroneous. Numerous specimens are in the Museums of the Academy and of the Smithsonian Institute, those in the latter received from Mr. C. B. Adams, (Nos. 5756, 5758½.)

*Anolis (Dracontura) lionotus* Cope.

Neck and extremities long; head short, broad, elevated posteriorly, concave

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in profile. Nostrils lateral; scales of the middle and extremity of the muzzle small, numerous. Occipital elongate oval, not in contact with the superciliaries. The latter, four on each side, separated on the medial frontal line (which is concave), by a series of very small scales. Facial rugæ almost obsolete, enclosing an ovoid concavity, broader anteriorly, which is occupied by elongate smooth scales. Three or four palpebrals of large size, surrounded by several smaller plates, some of them weakly keeled. Canthus rostralis short; loreal scales in eight series. Superior labials eight. One large symphyseal scarcely divided; no larger series ("infralabials") beneath the inferior labials. Goitre moderate. Scales of the sides small, not keeled; of the belly larger, smooth; of the back still larger, in about twelve rows, smooth; no dorsal or nuchal crest. Tail stout at the base, compressed, the median superior scales flat, offering no rudiment of a crest. Digital expansions narrow. Anterior extremity reaching to the groin; the posterior, to the nostril, when extended forward. The scales of the upper surfaces of the extremities, moderate, flat, weakly keeled.

General color above, bronze brown, with a few darker shades on the dorsal region. Tail and hinder extremities paler, femora light spotted behind. A light band extends from the angle of the mouth to the middle of the side. Beneath it there are brown vermiculations, which become darker near the groin. Belly immaculate; lips dark.

One specimen in the Museum of the Academy, sent from Cocuyas de Veraguas, New Grenada, by Mr. R. W. Mitchell.

*Anolis (Dracontura) cyano pleurns Cope.*

Size small; form very slender. Head elongate, facial rugæ weak, converging anteriorly above the plane of the canthus, enclosing an elongate concavity. Series of superciliary plates not in contact medially, and separated from the occipital—all tricarinate. Scales of the muzzle smaller, tricarinate. Two or three tricarinate palpebrals; six loreal rows. Upper labials six or seven; infralabials small, keeled. Six dorsal rows of more or less hexagonal plates, smooth or tricarinate, equal to or larger than those of the belly, which latter are strongly keeled. Scales of the sides small. Scales of the upper surfaces of the extremities flat, keeled. Tail three times the length of the body, slightly compressed, the scales of its median line similar to those of its sides, keeled. The posterior extremity extended reaches the middle of the frenal region. Digital dilations narrow. Total length 5 in. 6 lin.; tail 4 in. 2 lin.

Under surface of head, body, extremities and base of tail, golden greenish yellow; a broad dorsal band of the same, involving only the six rows of large scales. This band divides upon the nape, sending a narrow line to the posterior border of each orbit. Occiput and sides deep blue, the latter darker near the dorsal band, where it is sometimes marked with a longitudinal series of golden dots. The muzzle and side of the head are dark bluish or blackish; in the males the goitre is large, and, with the abdomen, of a pale bluish tint—not golden, as in the female. In the former, the posterior extremities are marked with a few light cross bars; in the latter the femora have an additional light posterior border.

The specimens described were found at Monte Verde, Cuba, and sent to the Smithsonian Institute, by Mr. C. Wright, (Type No. 5737.) Some of them have been presented to the Academy's Museum. The species is one of the most elegant and brilliant of the charming little group designated by some authors, as it appears to me without sufficient reason, as a genus, under the name of *Dracontura*.

*Anolis (Dracontura) ophiolepis Cope.*

Size small; tail less than twice the length of the body. Occipital plate not in contact with the superciliaries; the latter, four on each side, the two anterior largest, equal, not separated from the palpebral disc by small scales, in 1861.]

contact medially, or more usually separated by a series of narrow scales. Palpebrals about six in each disc, weakly keeled. Scales of the muzzle unicarinate; facial rugæ not very prominent, much raised above the plane of the canthus rostralis, enclosing a very shallow concavity. Superior labials four or five; first pair of inferior labials ("mentals") large; infralabials small, elongate. Goitre small. Scales of the sides granular; scales of the belly, tail, extremities and from thirteen to seventeen dorsal rows, elongate, strongly carinate. Digital expansions narrow. Anterior extremity not reaching the groin, the posterior reaching the middle of the orbit. Length of head and body 1 in. 5 lin.; of tail, about 2 in., (mutilated.)

The under surfaces are yellowish, unspotted. Above, the ground color is golden olivaceous in the males, in the females golden brown. There is a slight median dorsal line extending to the sacral region; another similar one extends from the superior posterior part of the orbit upon the anterior part of the tail, and a third from the posterior superior labials, through the tympanic orifice, upon the base of the tail. The superior lateral band is bordered above by a deep brown band.

Specimens (No. 5732) in the Smithsonian Institute from Monte Verde, Cuba, from Mr. Charles Wright, and in Mus. Acad. Nat. Sci.

This species is somewhat similar in proportions to *A. pulchellus*, *D. & B.*, which it seems to connect with the *Dracontura*.

*Anolis (Dracontura) duodecimstriatus*, *Cope*. *Dracontura duodecimstriata* Berthold, Ueber Verschiedene neue oder seltene Amphibienarten, 1842, p. 18. *D. Bertholdii* Fitz., Syst. Rept. 1844. *Norops macrodactylus* Hallow. Proc. Acad. Nat. Sci. Phila. 1856, p. 222.

Dr. Hallowell's description was taken from specimens much decolorized by alcohol. The only differences noticeable, on comparing with Berthold's description, are, that the inferior brown band does not pass along the middle of the side, but on the borders of the ventral plates; and that the central palpebral shield is not the largest, while the whole disc is in contact with the superciliaries, with but one or two minute scales intervening.

*Habitat*.—New Grenada? Surinam.

*Anolis (Dracontura) alutaceus* *Cope*.

Size small, form elongate. Plates of the front and muzzle weakly many-keeled or smooth, those of the superciliary ridge separated medially by small scales, in number four on each side, the anterior largest and in line with two or three large scales anterior to it. Occipital plate small, irregular, widely separated from superciliaries; the latter separated by granules from the five to seven plated palpebral disc. Facial rugæ distinct, not elevated, convergent anteriorly, and enclosing a very elongate depression. Canthus rostralis straight, elongate, not prominent; nostril lateral, terminal. Rostral plate rather large, its superior border curved, and of a light color. Upper labials seven; lower, nine, the first pair (mentonnières, *D.* and *B.*) transverse, separated by a short straight median suture. Goitre of female rudimentary; of male, elongate, perhaps not very extensible. Ventral plates smooth, transversely oblong, in some specimens having a carinate appearance upon the thoracic region. Lateral scales small, gradually blending into the larger dorsal, of which there are about ten rows, weakly keeled. Scales of the external surfaces of extremities rather large, weakly one many keeled. Tail cylindrical, a little more than twice the length of head and body. Posterior extremity reaching to (♂) middle, anterior, or (♀) posterior part of orbit; anterior extremity two-thirds the distance to the groin. Auricular opening moderate. Total length of adult male 5 in. 3 lin.; tail, from vent, 3 in. 7 lin.; head to ear 7 lin.

Color of the adult male above, dark cinnamon brown, deeper on the head and extremities; beneath paler, thickly punctulated with brown on the throat, sides and extremities. On the head a light band crosses the anterior part of

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the supraorbital region, and another extends longitudinally back from the rostral plate; there is a light triangular area upon the posterior upper labials. A dark shade upon the occiput. Posterior part of the femur pale; digits specked with lighter. In the female the colors are lighter and more varied; there are dark shades upon the dorsal region, and oftentimes on the sides of the neck.

Specimens (5737½) in Mus. Smithsonian Inst., whence the Acad. Nat. Sci. has obtained examples; part of a very valuable collection made at Monte Verde, Cuba, by Mr. Chas. Wright.

This species represents the same form as *A. cyanoleurus* and *argenteolus*, though in the nature of the scales it approaches slightly the *Loyisianus* type. It is very easily recognized.

*Anolis (Gastrotropis) lemurius* Cope.

Size small; tail about twice the length of the head and body. Head short, broad, front concave, eyes very large. Occipital plate small, elliptic, separated from the granulations posterior to it by a single series of small plates, and by two series from the superciliaries. The latter are in contact on the medial frontal line, or separated by one row of very small scales. Facial rugæ obsolete; one large scale bordering the first superciliary anteriorly, and separated from those of the canthus rostralis by a few of nearly equal size; the remaining scales of the front and muzzle are small, (less upon the latter,) polygonal, carinate. Nostrils subterminal. Canthus rostralis very short, making an angle of 40° with the commissure of the mouth. Six loreal rows of scales, six or seven superior labials, infralabials small, keeled. Palpebrals fifteen to twenty, more or less keeled, separated from the superciliaries by small scales. A weak nuchal fold. Superior femoral and brachial scales small. Inferior lateral scales smaller than dorsal, the latter, with the superior lateral and ventral, keeled. Tail entirely cylindrical, covered with strongly keeled scales. Anterior extremity reaching the groin; posterior, extending forward to the posterior, sometimes the anterior border of the orbit. Goitre small. Total length 2 in. 10 lin.; tail 2 in. 5 lin.

Color leek-green tinged with brown anteriorly; muzzle brownish, a brown band between the eyes. A crescentic brown band upon the occiput, angularly bordered with black anteriorly, and having a median longitudinal black spot. A similar small black spot upon the nape at the confluence of two oblique pale brown bands, one from each orbit, often pale bordered inferiorly; the pale border sometimes extending to near the groin as a narrow longitudinal band. A third small black spot upon the interscapular region. Three or four large brown spots upon the posterior part of the dorsal region. Sides and labial region varied with brown; extremities and digits obliquely banded with the same. Belly immaculate, the reflections golden and green.

Three male specimens in Mus. Academy from Veragua, New Grenada, sent by Mr. R. W. Mitchell. A female specimen before us, from the same locality, which resembles *A. Sallei*, as well as this species, has a broad, dark bordered, ochraceous dorsal band, black bordered and partially embracing a pale angular area upon the occiput; a chevron-shaped brown band between the eyes; several dark lines radiating from the orbit; sides and belly immaculate; digits, goitre and labial plates black spotted; extremities immaculate, except a pale mark on the posterior face of the thigh.

*Anolis (Gastrotropis) argenteolus* Cope.

Size small, form elongate. Head elongate, acute; facial rugæ obsolete, frontal concavity shallow, short. Interorbital space very narrow, orbits large. Canthus rostralis but little prominent anteriorly; nostril lateral, subterminal. Plates of the front not small, subhexagonal, smooth. Superciliary plates four or five on each side, elongate, in close contact on the median frontal line, separated from the small occipital. Superoocular or palpebral disc more or less iso-1861.]

lated by granules, seven-plated, of which three are largest; all smooth. Loreal rows five; inferior and supralabials nine, the former bordered by one row anteriorly, posteriorly by three rows of infralabials. The "mental" plate large, in contact medially by their anterior angles only. Anricular opening large; goitre none, (probably the specimen is a female.) Dorsal scales very small, those of the lower part of the sides perhaps smaller. The exposed faces of the extremities covered with large, weakly-keeled or smooth scales. Tail without crest, covered with small scales, at intervals verticillate. Anterior extremities extending to behind the groin, posterior, to end of muzzle. Length of head to auricular opening 7 lines; from ear to vent 14 lines. Tail elongate, (mutilated.)

Above silvery gray, with four chevron-shaped brown cross-bands; a similar band upon the nape. The muzzle, occiput, extremities and sides of the neck, are varied with pale brown, the last in a longitudinal manner. A short silvery band from inferior border of orbit to ear. Beneath white, with golden and green reflections; anal region and inferior surfaces of femora yellow.

One specimen from Monte Verde, Cuba, sent to the Mus. Smithsonian Inst. by Mr. Chas. Wright, (No. 5737 $\frac{3}{4}$ .)

This interesting species pertains, as to its form, to the same group as *Cyanopleurus*, exhibiting the same elongation of head and hinder extremities; but the squamation is that of *A. alligator* or *bullaris*.

*Anolis (Ctenocercus) isolepis* Cope.

Allied to *A. vermiculatus* and *angusticeps*. Size small, form stout, head large, extremities short. Muzzle quite elongate, depressed anteriorly; nostrils vertical, longitudinal, their posterior border at a point marking one-third the space between the end of the muzzle and anterior border of the orbit. Auricular opening not larger than nostril. Front very plane, facial ridge not distinct, more acute anteriorly, where they converge. Canthus rostralis very prominent, straight. Superciliary ridges but little prominent, each protected by four plates. The most anterior of these is the largest, and in line with a longitudinal row of large, smooth, elongate, hexagonal shields four or five in number, the last three pair elongate and in contact. They are separated by one series of small scales from the rostral plate, and are in contact with the plates of the canthus rostralis, and with a median series of similar plates which extend to the occipital. The latter is small, and separated from the superciliaries. Palpebral disc irregular, having two or three plates much larger than the others. Loreal rows three; upper labials eight; inferior labials nine, elongate; infralabials large, faintly many-keeled, in a single series anteriorly, posteriorly in three rows. Goitre very small. The scales of the neck, body, and extremities (except the inner surfaces of the latter) are of nearly equal size, round or oval, nowhere keeled, but thickened medially. The extremities are short, the anterior reaching two-thirds way to the groin, the posterior to the shoulder. Digital expansions broad. The tails of the specimens are mutilated, except in a young male, where it is entirely cylindrical, covered with small keeled scales distantly verticillate; its length is once and a quarter that of the head and body. Number of maxillary teeth in adult male about twenty-one; of these only about twelve are tricuspidate. Teeth on the os palatinum. In the female the head is shorter, and hence with more convergent lateral outlines. Total length, young ♂, 30 lin.; tail 17 lin. Length of head and body, ♂, 1 in. 6 lin.; head to ear 6 lin. Ditto, in ♀, 1 in. 4 lin.; 5 lin.

*Coloration*.—Greenish glaucescent blue, paler below. A narrow light line extends from upper lip to auricular opening, and in the female there are a few dots of the same color. She has also a series of indistinct dark spots on each side of the median line posteriorly. There is a purplish tinge about the jaws, which prevails upon the whole body when the epidermis is removed. A young male is ornamented with a few broad transverse bands on the back and

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tail, with crescentic marks upon the nape, as in *Varanus uiloticus*, and light and dark variegations upon the front and chin, (Smiths. No. 5742 $\frac{1}{2}$ .)

Specimens (adults, No. 5738) in Mus. Smithsonian, from Monte Verde, Cuba, Mr. C. Wright discoverer; also Mus. Acad. Nat. Sciences. This interesting species resembles somewhat the form of *A. (?) carolinensis*, from Cuba. In specimens of that species of very small size the facial rugæ are prominent, the frontal scales much more numerous, and those of the back and belly keeled. The breadth between the orbits greater in *isolepis*, and the auricular aperture smaller. In the oviduct of the female was found a single large egg. Observations upon numerous species of *Anolis*, incline me to adopt the suggestion of Dr. Günther, viz., that but one egg at a time is impregnated and excluded.

*Xiphocercus Valenciennii* Fitz., Syst. Rept. 1843. *Anolis Valenciennii* Dum. Bibr., Erp. Gen. iv. 131, 1837. *Placopsis ocellata* Gosse, Ann. Mag. N. H. 1850, p. 346. *Anolis leucocephalus* Hall., Proc. A. N. Sci. Phil. 1856, p. 228.

The genus first defined by Mr. Gosse, as above, though previously named by Fitzinger, is to be separated, in our opinion, not so much on account of the size of the plates of the front, but by reason of their curious homology with those of the plate headed Lacertidæ and Scincidæ, which is readily traced. In the tail, and nature of the dermal covering, it resembles *Eupristis*; in the form of the head it imitates *Anolis iodurus*, and *opalinus* most closely. It is interesting to observe that both these species, and *Eupristis Edwardsii*, *Cope*, inhabit with it the island of Jamaica.

### Notes on the Ornithology of Labrador.

BY ELLIOTT COUES.

During the summer of 1860 I accompanied an expedition in charge of J. W. Dodge, Esq., which visited the coast of Labrador, in order to procure for the Smithsonian Institution specimens of the birds to be found there, together with their nests and eggs, and to study their habits during the breeding season. The late period of arrival upon the coast, which was not until the first week in July, prevented any very extensive operations in the department of Oology, while the nature of the localities visited, joined with some circumstances of a private character, rendered the formation of a large collection of birds impracticable. In the following pages, however, are embodied the results of my investigations; and though the list of the species noticed is, from my limited opportunities for observation, necessarily incomplete, it is hoped that it will not be found entirely wanting in points of interest with regard to the habits of the birds which pass the breeding season in Labrador.

A brief notice of the different localities which were visited may not be considered unnecessary. The first point reached was Sloop Harbor, a few miles south of Little Mecattina, where were collected most of the eggs procured during the voyage. Here the *Somateria mollissima* and the *Utamania torda* were the most abundant and characteristic birds, while the *Larus argentatus*, *Uria grylle*, and *Mergus serrator* were also very numerous, all breeding on the islands in the vicinity. On the 6th of July, the vessel left Sloop Harbor, and, passing the Murre Rocks, where the *Uria lomvia* was breeding in immense numbers, proceeded directly to Esquimaux Bay, where the greater part of the summer was spent. Here were collected most of the land birds procured, among them the new *Aegiothus fuscescens*. *Zonotrichia leucophrys*, and *Anthus ludovicianus* were very abundant; and *Pinicola Canadensis* and *Turdus Allicæ* not rare. Grouse and Ptarmigan were also met with; and I was fortunately enabled to examine an extensive breeding place of the *Mormon arcticus* (?).

A few days were spent at Rigolet, a station of the Hudson Bay Company, in 1861.]

charge of Henry Conolly, Esq., from whom were received some valuable meteorological statistics. On the 15th of August the vessel left Esquimaux Bay, and proceeded to Henley Harbor, at the northern entrance to the Straits of Belle-Isle. At that date the smaller waders generally had commenced their southern migration, and during two weeks spent there, which completed my stay on the coast, specimens of most of them were procured.

In the preparation of the following pages, I have not attempted to present the synonymy of the species, nor their diagnoses. To do so would be but to repeat what may be found in full in the General Report on Birds, by Baird, Cassin and Laurence, (vol. ix. P. R. R. Exp. and Surv.) Reference is therefore made to the pages of this work; and also to Audubon's Birds of America, the standard authority on the habits of the birds, where the further history of each species will be found fully elucidated. The names and authorities adopted are strictly those of the General Report, except in a few cases where some change appeared necessary, from the characters of the birds entitling them to full generic rank.

FALCO (HYPOTRIORCHIS) COLUMBARIUS Linn.—Pidgeou Hawk. "Sparrow Hawk."

*Falco columbarius*, Aud., Birds Amer. vol. i. page 88, pl. 21.

*Falco (Hypotriorchis) columbarius*, Cassin, Gen. Rep. page 9.

The Pidgeon-hawk I met with on but two occasions. On the 5th of August, while on a small rocky island in Groswater Bay, one was seen circling in the air at a moderate height, and constantly uttering its loud harsh cries; but owing to its watchfulness, I could not secure it. On the 25th of the same month, at Henley Harbor, another individual was seen, foraging among the immense flocks of Curlews, (*Numenius borealis*), which then covered the hills in the vicinity. The Pidgeon-hawk is occasionally stuffed and offered for sale by the natives; and from their accounts I should judge it to be not at all rare. It is known to them as the "Sparrow-hawk," by which name, however, they also designate the *F. sparverius*.

On the return voyage, when more than a hundred miles from any land, a Pidgeon-hawk made its appearance, and after circling about for some time, to select the safest place on which to alight, at length settled on the outermost bowsprit rigging, apparently quite exhausted. Yet even in this worn-out condition so watchful was it, that on my levelling a glass at it, it instantly took flight and disappeared.

FALCO (TINNUNCULUS) SPARVERIUS Linn.—Sparrow Hawk.

*Falco sparverius*, Aud., Birds Amer. vol. i. p. 90, pl. 22.

*Falco (Tinnunculus) sparverius*, Cassin, Gen. Rep. p. 13.

But a single individual of this species, so abundant in most portions of the United States, was observed during my stay in Labrador. On the 10th of September, however, while in the Gulf of St. Laurence, off the Isle of Cape Breton, several were seen during the day. They circled quite closely around the vessel, showing but little fear.

? FALCO (HIEROFALCO) ISLANDICUS Gmelin.—Gyr Falcon. "Speckled Hawk."

? *Falco Islandicus*, Aud., Birds Amer. i. 81, pl. 19.

? *Falco (Hierofalco) Islandicus*, Cassin, Gen. Rep. 13.

I had not the good fortune to obtain, or even meet with, either species of Gyr Falcon. The hunters with whom I conversed on the subject, said that they were seldom seen in the summer, but that they become more abundant in the autumn and winter. They were represented as at all times very shy and difficult to procure, frequenting the highest and most inaccessible crags, and subsisting mainly on Grouse and Ptarmigan. I could not, of course, determine from these accounts whether *F. Islandicus* or *candicans* was referred

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to ; but the habits of both are probably exceedingly similar, if not identical. They are known to the natives under the name of "Speckled-hawks."

ASTUR ATRICAPILLUS (Wils.) Bon.—Goshawk. "Partridge-hawk."

*Astur palumbarius*, Aud., Birds Amer. ii. 95, pl. 23.

*Astur atricapillus*, Cassin, Gen. Rep. 15.

I obtained a single specimen of this hawk, in immature plumage, from a small collection of skins offered for sale by the natives. They know it as the "Partridge-hawk," but further than this I learned nothing respecting it. It does not appear to be abundant.

ARCHIBUTEO SANCTI-JOHANNIS (Gm.) Gray.—Black-hawk.

*Archibuteo Sancti-Johannis*, Cassin, Gen. Rep. 33.

While at Puffin Island, on Groswater Bay, I twice saw a large hawk that I supposed to be this species. It was hovering at a great height over the island, and constantly uttered its loud, piercing screams. I was unable to secure this specimen, which was the only one I observed during my stay in Labrador.

AQUILA CANADENSIS (Linn.) Cassin.—Golden Eagle. "Grepe."

*Aquila chrysetos*, Aud., Birds Amer. i. 50, pl. 12.

*Aquila Canadensis*, Cassin, Gen. Rep. 41.

An intelligent hunter, whom I questioned concerning this Eagle, informed me that though he knew it well, it was very rare, and very seldom obtained. His description was so exact, that I had no difficulty in determining that the present species was referred to, and not the *Haliaetus albicilla*, concerning which, though it may be found in Labrador, I could learn nothing. He applied to the *A. Canadensis* the name of "Grepe," or "Greep," the derivation of which word I was unable to ascertain.

BUBO VIRGINIANUS (Gm.) Bon.—Great Horned Owl.

*Bubo Virginianus*, Aud., Birds Amer. i. 143, pl. 39. Cassin, Gen. Rep. 49.

A single specimen of this bird which I saw at Rigolet, made me aware of its existence in Labrador. I learned nothing of its habits ; which, however, in all probability, do not differ materially from those of the more southern bird.

PICOIDES ARCTICUS (Sw.) Gray.—Arctic Three-toed Woodpecker.

*Picus arcticus*, Aud., Birds Amer. iv. 266, pl. 268.

*Picoides arcticus*, Baird, Gen. Rep. 98.

I did not myself meet with any individuals of the Three-toed Woodpecker ; but I saw a specimen in a collection of skins made by the natives. It is probably not rare in the interior.

CERYLE ALCYON (Linn.) Boie.—Belted Kingfisher.

*Alcedo alcyon*, Aud., Birds Amer. pl. 77

*Ceryle alcyon*, Baird, Gen. Rep. 158.

I ascertained the existence of this bird in Labrador, from a single skin in the possession of the natives. They considered it as a rare bird.

TURDUS (TURDUS) ALICIA Baird.—Grey-cheeked Thrush.

*Turdus (Turdus) Alicia*, Baird, Gen. Rep. 217.

I was not a little surprised to find this species breeding abundantly in Labrador, its habitat being given by its describer as "the Mississippi Region to 1861.]

the Missouri."\* On the 24th of July I came upon a family of these birds in a deep thickly wooded ravine. The young were apparently just commencing to fly. Both parents uttered constantly a rather melancholy "pheeugh," in a low whistling tone. The female evinced the greatest anxiety for the safety of her brood, and endeavored to lead me from their vicinity by fluttering from bush to bush; and it was only with some difficulty that I secured both parents. In the course of the same day I saw several of these Thrushes, only, however, among the thickest firs. They all uttered precisely the same note, and were very timid, darting into the most impenetrable thickets, so that it was with great difficulty they could be procured. They appear to be very abundant in Labrador; probably full as much so as the *T. Swainsoni* in most portions of eastern United States.

There are readily appreciable characters by which this species may be distinguished from the closely allied *T. Swainsoni*. The uniformly longer, straighter, and narrower bill is a striking feature. The upper parts are of a much darker shade of olive, as are also the sides under the wings, and the spots on the throat and breast. But the most prominent feature is the entire absence of any buff tinge on the throat and sides of the head and around the eye, so conspicuous in *T. Swainsoni*. The whole bird is also considerably larger.

TURDUS (PLANESTICUS) MIGRATORIUS Linn.—Robin.

*Turdus migratorius*, Aud., Birds Amer. iii. 121, pl. 142.

*Turdus (Planesticus) migratorius*, Baird, Gen. Rep. 218.

The Robin, so common and well known throughout the United States, is equally abundant in all well wooded districts in Labrador. Its habits are so familiar to every one, that a detailed account of them would be superfluous. I remarked, however, that they appeared to be shyer than might be expected in a country where they are so seldom molested.

SAXICOLA ANANTHE Bechst.—Stone Chat.

*Saxicola ananthe*, Baird, Gen. Rep. 220.

? *Saxicola ananthoides*, Vigors, Zool. Voyage Blossom, 1839, 19. Cass. Ill. i. 1854, 208; pl. xxxvi.

I had the good fortune to procure a specimen of this interesting bird, at Henley Harbor, on the 25th of August. The sailor who brought it to me stated that it was in company with two others, but could give no intelligible account of its voice or manners. It was in immature plumage, very different from that of the adult, and was excessively fat.

The North American *Saxicola* has by some authors been considered distinct from the common European *S. ananthe*, under the name of *S. ananthoides*, first applied by Vigors to a bird from the North-west Coast. The author remarks upon its very close affinity to the European bird, and apparently considers the locality as the strongest ground for supposing a specific distinction. The name was subsequently applied by Cassin, in the work above cited, to a bird from Nova Scotia, the larger size and rather different proportions of the tarsus being with this author the most important characters. In a critical comparison of specimens from Europe, Greenland and Labrador, I have been unable to detect any distinctive features beyond those of size, and very slight differences of proportion; which last, however, are not constant, or greater than exist between undoubted specimens of *S. ananthe*. The difference in size is no greater than would be expected from the more northern locality of the bird.

\*I have since detected this species at Washington, D. C.; and well characterized specimens have also been obtained in the same locality by my friend, Mr. D. W. Prentiss. This would seem to indicate an eastern range at least equal to that of *T. Swainsoni*, with which it is found associated, in the region west of the Mississippi.

examined. In the table of comparative measurements given below, it will be seen that the specimens from Greenland and Labrador are very nearly of the same dimensions, and also larger than European skins, though the details of bill, tarsus, &c., do not differ materially. It is not impossible that Vigor's bird should be distinct from the *S. ananthe*, especially as the measurements,\* if accurate, would indicate a bird of rather small dimensions for so northern a locality; but at present I cannot but regard the Labrador bird as identical with the European. The question can only be definitely settled by a series of specimens from different localities in both continents.

## COMPARATIVE MEASUREMENTS.

No.	Locality.	Age.	Length.	Extent.	Wing.	Tail.	Bill above.	Along Gape.	From Nostril.	Tarsus.	Mid. Toe & Claw.	Hind Toe & Claw.
	Europe, .....	ad.	5·90†		3·73	2·45	·50	·80	·38	1·07	·82	·57
18958	France, .....	yg.	5·50†		3·73	2·30	·52	·79	·40	1·07	·87	·59
20551	Greenland, ..	yg.	6·20†		4·05	2·55	·49	·78	·40	1·10	·85	·58
18075	Labrador, ..	yg.	7·00	12·6	4·05	2·55	·50	·79	·40	1·08	·83	·58

† of Skin.

## REGULUS CALUNDULA (L.) Licht.—Ruby-crowned Kinglet.

*Regulus calendula*, Aud., Birds Amer. ii. 168, pl. 133. Baird, Gen. Rep. 226.

A single specimen, a bird of the year, was obtained at Rigolet, on the 6th of August, shot in a very densely wooded ravine. No other individuals were observed. It is, however, in all probability an abundant bird in Labrador.

## ANTHUS LUDOVICIANUS (Gm.) Licht.—Tit-lark.

*Anthus ludovicianus*, Aud. Birds Amer. iii. 40; pl. 150. Baird, Gen. Rep. 232.

The Tit-lark I found abundant in every locality in Labrador which I visited, and I had ample opportunities of observing its habits during the breeding season. It is the most numerous of the land birds, with the exception, perhaps, of the white-crowned sparrow, *Zonotrichia leucophrys*. Some of the most rocky and barren islands along the coast are inhabited only by these birds, with perhaps a solitary pair of horned larks, *Eremophila cornuta*. It frequents only open, bare, and exposed situations, such as the coast of Labrador every where affords, and is never found in thickly wooded localities.

Two nests which I obtained, were precisely identical in situation, form and construction. Each was placed on the side of a steep precipitous chasm, in a cavity in the earth of about the size of a child's head, into which a little dried moss had been previously introduced to keep the nest from the damp earth. It was composed entirely of rather coarse dried grasses, very loosely put together, with no lining of any sort. The external diameter was about six inches; the exterior three inches, by two in depth. The eggs were in one instance five, in the other four; their average length, for they varied somewhat, was thirteen-sixteenths of an inch, by nine-and-a-half-sixteenths of an inch in greatest diameter; of a dark chocolate color, indistinctly marked with numerous small lines and streaks of black.

The parent does not leave the nest until nearly trodden upon; then she flutters off with loud cries of distress which soon bring the male, though without attempting to lead the intruder from the nest by feigning lameness, as is the habit of so many birds. The pair together hover over the head of the in-

\* "Length,  $5\frac{1}{2}$ ; wing,  $3\frac{3}{8}$ ; bill, rictus,  $\frac{3}{4}$ ; tail,  $2\frac{1}{4}$ ; tarsus, 1."

truder, at times approaching within a few feet, and all the while expressing their distress and anxiety by the most plaintive cries, until he withdraws; they even then frequently follow him for some distance. On such occasions several pairs in the vicinity are often attracted to the spot, and join their cries with those of the afflicted parents. Besides these cries, and their usual chirp, these birds have a much lower softer "tsip;" and the males during the breeding season have a very sweet, pleasant song.

The flight of the Tit-lark is performed in an unsteady undulating manner, and is not ordinarily protracted to any great distance. On alighting they rapidly vibrate the tail several times, in the manner of all the *Motacilline*. They seldom or never alight on trees or bushes, but always on the ground, where they walk or run with great ease and rapidity. They are fond of resorting at low tide, to the "land-washes," (as the low muddy flats over which the tide flows are styled in Labrador,) where they run about on the mud and dried "Eel-grass," (*Zostera*), searching for food in company with the smaller Sand-pipers, and very much in the same manner. Though finding an abundance of food, none that I examined were at all fat. They at all times exhibit a heedless familiarity and entire want of fear of man, though the observer may be standing within a few paces. They feed unconcernedly around the doors of the houses; and I have frequently seen them searching for food on the very roofs of the sheds and houses; which, being thatched with brush, and a layer of turf, afford a convenient lurking place for their insect prey.

DENDROICA PINUS (Wils.) Baird.—Pine-creeping Warbler.

*Sylvicola pinus*, Aud. Birds Amer. ii. 37; pl. 82.

*Dendroica pinus*, Baird, Gen. Rep. 277.

This, and the succeeding species were the only *Dendroicas* met with in Labrador. The single specimen of the Pine-creeping obtained was shot in very dense fir woods, on the 1st of August, and was a young bird apparently just able to fly.

DENDROICA STRIATA Baird—Black Poll Warbler.

*Sylvicola striata*, Aud. Birds Amer. ii. 28; pl. 78.

*Dendroica striata*, Baird, Gen. Rep. 280.

This species I observed in every suitable locality, and was the only warbler I found abundant. It is very numerous in all well wooded situations, and is a most expert fly-catcher. On many occasions I saw it dart into the air in pursuit of flies, mosquitoes, and other insects, and return again to the same twig, in the manner of our common Wood Pewee, *Contopus virens*. This seems to be a more constant habit with this warbler, than with any other of its genus.

PARUS HUDSONICUS Forster.—Hudsonian Titmouse.

*Parus Hudsonicus*, Aud. Birds Amer. ii. 155; pl. 128. Baird, Gen. Rep. 395.

This species I met with on several occasions, always finding them associating in small restless companies. I experienced great difficulty in procuring specimens, owing to the dense nature of the firs they inhabit; for when in sight, they were always so near, that it was almost impossible to kill them without mutilation. Those procured were all young birds, exhibiting the markings of the adults very indistinctly. They were remarkably tame and familiar, hopping about unconcernedly within a few feet of my head, and hanging from the twigs in every conceivable attitude. I could discover little or no difference in their notes from those of the common Chickadee, *P. atricapillus*, to which they likewise exhibited a great similarity in their general manners, evincing the restlessness and activity so characteristic of the latter bird, and for which the whole family of *Paridæ* are so noted.

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## EREMOPHILA CORNUTA Boie.—Horned Lark. "Skylark."

*Alauda alpestris*, Aud. Birds Amer. iii. 44; pl. 151.

*Eremophila cornuta*, Baird, Gen. Rep. 402.

Very abundant on all the barren moss-covered islands along the coast, and in every suitable situation on the main land. Labrador, indeed, from the fact that it is the most southern region which affords the peculiar open and exposed situations which these birds exclusively frequent, seems to be their special breeding ground. In their voice, flight, and general manners I noticed nothing different from their usual habits, well known during their extensive southern migration, except that they of course do not associate in flocks during the breeding season. To the natives they are known by their usual name of "Sky-larks."

## PINICOLA CANADENSIS (BRISS.) Cab.—Pine Grosbeak. "Mope," "Redbird."

*Corythus enucleator*, Aud. Birds Amer. iii. 179; pl. 199.

*Pinicola canadensis*, Baird, Gen. Rep. 410.

The Pine Grosbeak I ascertained to be not at all rare along the coast of Labrador, where I obtained several specimens; and it is probably still more abundant in the interior. It is confined entirely to the thick woods and patches of scrubby juniper. It is not at all shy, rather evincing a heedlessness of the presence of man, that must arise from the fact that it is so seldom molested; still from the dense nature of the firs it inhabits, it is rather difficult to procure. The female of a pair I obtained sat unconcernedly on a twig only a few paces distant, while I reloaded after shooting her mate; uttering continually a low soft "shep," almost exactly like that of the common Fox Sparrow, *Passerella iliaca*. Another note which I occasionally heard was a prolonged whirring chirrup, uttered in a rather low tone, which appeared to be the usual note of recognition between the male and female. This bird is commonly known to the natives by the singular appellation of "Mope;" the derivation of which word I could not ascertain. It is also sometimes called the "Red-bird;" and it has in addition an Esquimaux name, which, however, I do not venture to attempt.

## AEGIOTHUS Cabanis.

Syn. *Acanthis*, Bonaparte, Consp. Av. 540. Nec Bechst. 1802; nec Keys. et Blas. 1840.

*Aegiothus*, Cabanis, Mus. Hein. 1851, 161. Typus *Fring. linaria* L. Baird, Gen. Rep. 1858.

*Gen. Ch.* Size small. Crown with a crimson patch; the breast and rump tinged with rosy in the male. Bill short, rather slender, conical, and acutely pointed, the lateral outlines concave; culmen, gony and commissure about straight. Upper mandible with several obsolete ridges parallel with the culmen. Base of upper mandible covered with rigid, appressed, bristly plumuli, concealing the nostrils. Wings very long, reaching beyond the middle of the tail; first, second, and third primaries nearly equal, second usually a little the longest. Feet short, weak; tarsus about equal to middle toe and claw. Inner lateral toe rather longer than the outer; hind toe rather longer than the inner lateral, its claw longer than the digital portion. Tail moderately long, deeply forked; of twelve feathers.

A genus of fringilline birds of the sub-family *Coccothraustinae* Baird, as defined by that author, coming between *Cannabina* Brehm, (Handbuch, 1828, Type *F. cannabina* Linn.), and *Leucosticte*, Swainson, (F. B. A. 1831, iii. 265, Type *Linaria tephrocotis*, Sw.,) though its affinities are clearly with the former genus. The general form, in the long wings, moderately long, forked tail, and very short, weak feet, and to some extent the pattern of coloration, in the conspicuous pileum, gular patch, rosy rump, &c., are very similar. But im-1861.]

portant differences are to be found in the slenderer, much more acutely pointed bill, with its decidedly concave lateral outlines, and the different character of the nasal plumuli. The toes are much shorter, the lateral unequal, and the tail feathers broader and more rounded.

*Aegiothus* of Cabanis (Mus. Hein. 1851, 161,) is based upon the *Fringilla linaria* of Linnæus; and supersedes *Acanthis* of Bonaparte (Consp. Av. 150,) which though used in connection with the present genus, is pre-occupied for another group.

*ÆGIOTHUS FUSCESCENS* Coues, Nov. sp.—Dusky Red Poll.

*A. Aegiotho linario paululum minor, rostro fusco magno, robusto plumulæ brevibus sparsisque; super-oribus partibus fuscis, vix lutæo striatis; alis caudæque vix albido marginatis, lateribus distinctè nec confluentè fusco-striatis. Mas nupt. temp. uropygii rosaceo, pectore carmesino. Long. 5.25 pollices; ala 2.90 poll.*

*Sp. Ch.* Bill large, very stout, the culmen and gonyes slightly convex. Nasal plumuli very short and scant, barely covering the nostrils. Wings very long, pointed; first primary usually longest, second nearly, sometimes quite equal to it, third and fourth successively a little shorter. Tarsus about equal to middle toe and claw. Inner lateral toe but very little longer than the outer, its claw reaching scarcely beyond the basal third of the middle claw. Tail of moderate length, deeply forked. *Male, adult.*—Bill dusky except at base below. Frontlet, space between eye and bill, and gular patch, dull sooty brownish black. Entire upper parts deep dusky or chocolate brown, the edges of the feathers scarcely lighter. Rump whitish, tinged with rosy, thickly streaked with dusky. Wings, wing-coverts, and tail, deep dusky, very narrowly margined and tipped with dull whitish. Throat, breast and sides for some distance bright rosy, or carmine. Sides thickly marked with narrow, sharply defined streaks of chocolate brown. Rest of under parts white. *Female adult.*—Rather smaller than the male; rump but slightly tinged with rosy, and few or no traces of the carmine on the breast, which is dull white streaked with dusky. Other parts as in the male.

Length 5.25 inches, extent 9.00, wing 2.90, tail 2.30. Bill above .35. Tarsus .55; middle toe with claw .55; inner lateral .38.

*Habitat.*—Northern and Eastern North America. Fort Resolution, (Kennicott.) Labrador, (Coues.)

The essential features in which this species differs from the *A. linaria*, are those given in the diagnosis. The most striking peculiarity of *form*, as there stated, lies in the bill, which in size and proportions more resembles that of *Leucosticte* than *Aegiothus*. The nasal plumuli are much shorter and more sparse. The other proportions are as in *A. linaria*, but the size is somewhat less. The colors are very different; the upper parts of *A. fuscescens* being so dark and so obsoletely streaked as to seem almost uniform, which appearance is further heightened by the very narrow light edging to the wings and tail, which is reduced to a minimum. The sides are very thickly, but at the same time very distinctly, streaked with narrow sharply defined lines of deep chocolate brown. These streaks in *A. linaria* are less numerous, illy defined and more or less confluent. The carmine on the breast of full plumaged males appears to be deeper than is usual in *A. linaria*, while at the same time the rump is less rosy.

This interesting bird, though by no means so common as the Tit-lark or White-crowned Sparrow, is yet abundant along the coast of Labrador, where apparently it replaces the allied *Chrysomitris tristis*, its southern representative. It is a remarkably unsuspecting and familiar species, showing no signs of fear even when very closely approached. It frequents almost exclusively the scrubby juniper which grows every where in open places, in thick, almost impenetrable patches. I do not think that I ever observed it in more densely

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wooded districts. Its flight is performed in an irregular desultory manner, rising and falling in cycloidal curves, and is seldom protracted to any great distance. While passing over head it utters continually a peculiar rattling chirp impossible to describe, yet once heard never to be mistaken; and while seated on a twig, or engaged in searching for food, it has all the plaintive and varied modulations for which the *Chrysomitris tristis* is so noted, and from which the latter derives its specific name. I never heard any thing that could with any propriety be called a song. The food of this species consists entirely of the seeds of various grasses; and when shot while feeding, it will be found to have the throat crammed with them. In this respect, as well as in voice, flight and general manners, I could not but be struck with the similarity which exists between this bird and the common Goldfinch. Audubon, in his account of the *A. linaria*, is at some pains to refute the opinion that there exists between that bird and the *Chrysomitris*, the great similarity in general habits that has been ascribed to it. Receiving the testimony of that unrivalled student of nature, the close resemblance which I am able to state does exist between the present bird and the Goldfinch, would furnish, if necessary, additional proof of the specific distinction of *A. fuscescens* and *linaria*; since the habits and manners of two birds, however closely allied, will always be found to differ in some particulars.\*

PASSERCULUS SAVANNA (Wils.), Bon.—Savannah Sparrow.

*Emberiza savanna*, Aud. Birds Amer. iii. 68; pl. 160.

*Passerculus savanna*, Baird, Gen. Rep. 442.

The partiality of this species for low moist meadows and watery savannahs, and the vicinity of the sea-shore, where it frequently associates with the *Ammodromus caudacutus*, is well known as its most characteristic habit. In Labrador, where it is abundant during the summer months, I never noticed it in any other situation. It was frequently to be seen even on the beds of dried "Eel-grass," (*Zostera*), along the rocky shore, searching for food in company with the Tit-larks, and Bonaparte's Sandpipers, *Actodromas Bonapartei*. It is a shy and timid species, when approached darting at once into the thickest and rankest grass. It is then rather difficult to procure; for it rises only when almost trodden on, flies a few yards in a rapid zigzag manner, and then darting down again, runs rapidly to a considerable distance. It is a very active species, almost continually in motion, running nimbly through the tall grasses like a mouse. I heard no notes except the usual sparrow-like chirp, though in the spring it has considerable vocal powers as I have ascertained on other occasions.† The young differ greatly from the adult, the plumage being every where strongly tinged with ferrugineous, most conspicuous on the wing coverts and tertials; the under parts are thickly streaked with dusky. On the 1st of September, when I left the country, the species was still numerous, apparently as much so as ever.

While off the coast of Nova Scotia, the land appearing as an indistinct line on the horizon, a Savannah Sparrow alighted on the vessel in so exhausted a state, as to suffer itself to be taken in hand. After resting a short time, however, it took flight and disappeared in the direction of the land, which it no doubt reached in safety.

ZONOTRICHIA LEUCOPHRYS (Forst.) Sw.—White-crowned Sparrow. "Chip-bird."

*Fringilla leucophrys*, Aud. Birds Amer. iii. 157; pl. 192.

*Zonotrichia leucophrys*, Baird, Gen. Rep. 458.

This large and handsome Finch breeds in great numbers along the entire

\* No individuals of *A. linaria* were seen during my stay in Labrador.

† At Washington, D. C., in the month of April.

coast of Labrador. Though I found it plentiful in every locality which I visited, and in all situations, it seems particularly fond of deep thickly wooded and secluded ravines, surrounded by high precipitous cliffs; and when in more open districts confines itself chiefly to the most tangled patches of juniper and scrubby fir. It is a very active and sprightly bird, almost continually in motion; it seldom alights without jerking and flirting the tail, and rapidly uttering its loud chirping. While the female is incubating, the male has a habit of mounting to the top of the cliff or tree nearest his nest, and there repeating his loud, somewhat monotonous, but not displeasing notes for a half hour at a time. This song is very similar to that of the allied *Z. albicollis*, the common White-throated Sparrow, and consists of two long drawn syllables with a rising intonation, and then three more in a quick hurried manner, with a falling cadence; "pēé, dēé, dē-dē-dē;" the whole a mellow whistle. Should the performer be observed or approached while thus engaged, he instantly becomes silent, and dives hastily into the nearest cover.

The nest of the White-crowned Sparrow is always, I believe, placed on the ground; and, oftener than elsewhere in the midst of the little patches of a low heath that grows abundantly wherever the ground is dry enough. It is composed externally of moss, internally of fine dried grasses, evenly disposed in a circular manner. The eggs are four or five, oftener the former. Nuttall,\* when he states that "the eggs, four or five in number, are said to be of a dusky or chocolate color," probably had reference to those of *Anothus ludovicianus*, which are much as he describes them. A nest of the White-crowned Sparrow, which I found on the 23d of July, contained four young, but a few days old. These, however, must have been rather late, as by the 1st of August there were many young birds to be seen. The female, when surprised on the nest, flutters off in silence, retiring but a short distance; but the male, if he be near, instantly flies to the top of the nearest tree or bush, and there vociferates his angry remonstrances, flirting his tail and jerking his body in the most energetic manner. This species, though not so familiar as the Tit-lark, is still frequently seen about the houses; and it is known to the natives simply as the "Sparrow," or oftener as the "Chip-bird."

JUNCO HYEMALIS (L.) Sclater.—Snow-Bird.

*Niphaea hyemalis*, Aud. Birds Amer. iii. 88; pl. 167.

*Junco hyemalis*, Baird, Gen. Rep. 468.

The Snow-bird, so common and so well known in winter throughout the eastern portions of the United States, is not so abundant as might be expected in Labrador, one of its breeding regions. From the fact that I was not in a suitable locality, I did not observe it until the latter part of July, at which time it was in small companies, the old and young associating together. They kept entirely in the thick woods, and were rather timid. I heard no song, nor indeed any note except the easily recognized chirp peculiar to this species.

Until within a few years the breeding places of the snow-bird were unknown, and its nidification involved in an obscurity remarkable for so common and familiar a bird. But it is now well ascertained to breed in the entire region around Hudson's Bay, and southward in the mountainous regions of New York and Pennsylvania.

SPIZELLA MONTICOLA (Gm.) Baird.—Tree Sparrow.

*Emberiza canadensis*, Aud. Birds Amer. iii. 83; pl. 166.

*Spizella monticola*, Baird, Gen. Rep. 472.

This little Sparrow is quite common in all wooded districts in Labrador. It is there a very tame and unsuspecting bird, showing no fear even when very

\* Manual of Ornithology, 1st ed. i., page 479.

closely approached. I heard no note beyond the usual sparrow-like chirp. It probably leaves the country for the south by the 1st of October, as early in November it is abundant throughout the United States as far south, at least, as Washington, where it may be found in great numbers during the winter months.

SCOLECOPHAGUS FERRUGINEUS (Gm.) Sw.—Rusty Grackle.

*Quiscalus ferrugineus*, Aud. Birds Amer. iv. 65; pl. 222.

*Scolecophagus ferrugineus*, Baird, Gen. Rep. 551.

This, the only representative of the *Icteridæ* I observed in Labrador, appears to be rather uncommon. I noticed nothing peculiar in its habits, very probably, however, because my opportunities for observation were so limited. The only note I heard was the rough guttural "chuck," common to most of the species of the family. On the 24th of July, I came upon a family of these birds, in a densely wooded marshy spot. The young were at that time just fully fledged, and were fluttering around the vicinity of the nest. The species is confined to heavily wooded districts, showing evident partiality for the low swampy or boggy localities, interspersed with pools, for which some parts of Labrador are so famous.

CORVUS CARNIVORUS Bartram.—Raven.

*Corvus corax*, Aud. Birds Amer. iv. 78; pl. 224.

*Corvus carnivorus*, Baird, Gen. Rep. 560.

This celebrated bird does not appear to be rare along the coast of Labrador. The high, precipitous and almost inaccessible cliffs, which, rising abruptly from the sea, give to this rock-bound coast such a barren aspect, afford safe and convenient retreats, where it constructs its nest, and rears its young in perfect safety. It is so excessively watchful and wary a bird, that although we saw them frequently, not a single individual was shot by any of our party. Indeed, I know of no bird more difficult to procure than the Raven; for in addition to its natural sagacity, which surpasses that of almost any bird, the peculiar nature of the rocks it inhabits render the surprising of it almost an impossibility. Its voice is similar to that of the common crow, but far louder and rougher. Ravens are most frequently seen in pairs; and they often descend to the sea shore, to feed on the dead fish, crabs, and other animal substances thrown up by the waves. The eggs, when they can be procured, are eaten by the natives; a species of vandalism well calculated to disturb the equanimity of any ardent collector or naturalist.

At Henley Harbor, an arm of Chateaux Bay, at the northern entrance to the straits of Belle-Isle, there is a remarkable geological formation, known as the "castle." This singular *butte* rises abruptly to a height of between 150 and 200 feet above the level of the sea. The sides are either perpendicular or even over-hanging, the strata perfectly vertical, regular and composed of pentagonal prisms, remarkably distinct. The top is perfectly smooth and level, and covered with a rich growth of moss, lichens, and the *Empetrum nigrum*. The ascent can be effected only at one point, where the soft crumbling rock has been worn away by the long continued trickling of water. The whole appears to be in a state of rapid decomposition; large masses of rock lie around the base in confusion, the strata, however, still distinctly visible. The débris thus accumulating at the base has raised a slope to within about fifty feet of the summit. A narrow but very deep channel, cut apparently by the action of the water, separates from it an island on which is another but less extensive formation of the same nature. This "castle" was the abode of a pair of Ravens, which, I was told, had resorted there regularly for several years. The nest was placed on a narrow ledge, inaccessible except from above by means of a rope. It was empty at the time I visited the place.

## CORVUS AMERICANUS Aud.—Crow.

*Corvus Americus*, Aud. Birds Amer. iv. 87; pl. 225. Baird, Gen. Rep. 566.

On the 14th of July, while under full sail, a crow flew directly past the vessel, near enough for me to identify it without the possibility of mistake. It was the only individual observed during my whole stay in the country.

## PERISOREUS CANADENSIS (L.) Bon.—Canada Jay. "Whiskey Jack."

*Garrulus brachyrhynchus*, Swainson, F. B. A. 1831, ii. 296; pl. 53. juv.

*Garrulus Canadensis*, Aud. Birds Amer. iv. 121; pl. 234.

*Perisoreus Canadensis*, Baird, Gen. Rep. 590.

My first acquaintance with this remarkable Jay was on the 1st of August, in a very dense spruce forest. Contrary to my previous impressions regarding the species, on this occasion they were very shy, alighting only on the tops of the tallest trees, and flying off with loud harsh screams on my approach. Subsequently, however, at Rigolet, I found them abundant, and very familiar; one or more were always to be seen hopping unconcernedly in the garden patches around the houses, not in the least incommoded by the presence of man, and showing no signs of fear when very closely approached. The voice of this bird is a loud, harsh, discordant scream, very unlike that of the Blue Jay, *Cyanura cristata*. It possesses all the cunning and thievish propensities for which the whole family of garruline birds are so noted. It is particularly expert in stealing the bait from the fox and marten traps, on which account it is greatly detested by the hunters, who destroy it whenever opportunity occurs. Its most common appellation is simply "*Jay-bird*," though it is also known as the "*Whiskey-Jack*." According to Dr. Suckley, (P. R. R. Rep. xii. pt. ii., p. 216,) who is indebted to Mr. Kennicott for the information, this curious appellation is probably a corruption of the Chippeway name "*Wiss-ka-chon*," changed first into "*Whiskey-John*," and then further twisted to "*Whiskey-Jack*."

The young Canada Jay is wholly of a dull sooty black, with no white whatever about the head. In this state of plumage it has been described and figured by Swainson (F. B. A. 1831, ii. page 296, pl. 55) as a distinct species, under the name of *Garrulus brachyrhynchus*.

## TETRAO CANADENSIS Linn.—Canada Grouse. "Spruce Partridge."

*Tetrao Canadensis*, Aud., Birds Amer. v. 83, pl. 294. Baird, Gen. Rep. 622.

Although the proper abode of the Canada Grouse is the dense and almost impenetrable forests of spruce and fir in the regions around Hudson's Bay, where it is an abundant bird, it is also found as far south as Maine and New York. There, however, it is chiefly confined to the more mountainous regions. In the west it is replaced by the closely allied *T. Franklinii* of Douglas, distinguished by the absence of the rufous band on the tail, and the conspicuously white margins of the tail coverts. The Canada grouse are mostly restricted to thickly wooded regions, where they find an abundance of their favorite food, consisting of seeds and berries of all kinds, and the buds of various shrubs. When skinned they emit a peculiar aromatic odor, arising from the highly flavored nature of their food; their flesh is dark colored and rather bitter. When disturbed they fly but a short distance, soon alighting on the trees, in which position they may be easily approached. The young, which seldom, I believe, number more than five or six, are led about by the parent for some time after they are able to fly. On the 24th of July I surprised several broods, still under the care of the parent. The mother, on discovering me, instantly uttered a "cluck," very similar to that of the common hen, and flew on to the nearest tree, while the young scattered in every direction, and concealed themselves in the thickest brush. A chick which I obtained at that date flew with perfect ease, though it could not have been more than

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two weeks old, and was as yet covered with scarcely anything but down. Its color was a dirty yellow; the few feathers buff, transversely barred with brown; and in size it was about equal to a chicken a week or ten days old.

The species is invariably known as the "Spruce Partridge."

LAGOPUS ALBUS (Gm.) Aud.—Ptarmigan. "Willow Partridge."

*Lagopus albus*, Aud., Birds Amer. v. 114, pl. 299. Baird, Gen. Rep. 633.

Great confusion prevails among the North American Ptarmigan, both with reference to the number of species to be enumerated, and their relationships to those of Europe. This is occasioned partly by the remote and inaccessible nature of the regions they inhabit, which cause comparatively few specimens to reach the hands of naturalists, and the difficulty of procuring them in summer plumage; since in winter they are almost entirely white, and present few distinctive marks beyond those of size and slight differences of proportions. By the latest authority on the subject, four species are assigned to North America: *L. albus* Aud., (the old *Tetrao albus* of Gmelin,) the largest, entirely white except the tail feathers, and with a very stout bill; *L. rupestris* Leach, which is smaller, with a slenderer bill and a black stripe through the eye; *L. Americanus* Aud., a species doubtfully admitted, coming nearest to the *albus*; and *L. leucurus*, a small western species, concerning which there has been no difficulty. Two of these species are found in Labrador: the *L. albus* and *rupestris*, known respectively as the "Willow" and "Rock Partridge." The distinction between them is always recognized; and they are so named from the fact that the former is confined chiefly to thickly wooded districts, while the latter inhabits more open and barren situations.

On the 23d of July I came upon a pair of the larger kind, amid tangled bushes in a low swampy situation. They were very tame and unsuspecting, walking unconcernedly along but a few feet from me, though their being in deep moult, and unable to fly, may have been the cause of this remarkable familiarity. I am credibly informed, however, that at certain seasons, while perched on trees, they can be captured by a noose at the end of a rod or pole. Great numbers of these birds are skinned and stuffed by the natives, while in winter plumage, and sold for about 25 cents apiece. While being skinned, they emit a highly aromatic odor, very similar to that given out by the Spruce Partridge. Their flesh is much used as an article of food.

LAGOPUS RUPESTRIS Leach.—Rock Ptarmigan. "Rock Partridge."

*Lagopus rupestris*, Aud., Birds Amer. v. 122, pl. 301. Baird, Gen. Rep. 635.

This species also occurs along the coast of Labrador, though, as might be expected from the densely wooded nature of the greater part of the country, much less abundantly than the preceding. I did not meet with it except in the collections of the natives.

BOTAURUS LENTIGINOSUS Steph.—Bittern.

*Ardea lentiginosus*, Aud., Birds Amer. vi. 94, pl. 365.

*Botaurus lentiginosus*, Baird, Gen. Rep. 674.

The Bittern is the only species of Heron which ventures so far north as Labrador, with the exception of the *Ardea herodias* and *Nycticardea Gardeni*, which may possibly be found within its limits. The only indications I discovered of the presence of the Bittern was a wing in the possession of a hunter, who, however, did not consider it as a very rare bird.

CHARADRIUS VIRGINICUS Borck.—Golden Plover.

*Charadrius marmoratus*, Aud., Birds Amer. v. 203, pl. 316.

*Charadrius Virginicus*, Cassin, Gen. Rep. 690.

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No Golden Plovers were observed until a short time before we left the country; then, about the date of the departure of the Curlews, *Numenius borealis*, they made their appearance in small numbers, in flocks of about a dozen or more. Some of them were in very perfect plumage.

*ÆGIALITIS SEMIPALMATUS* (Bon.) Cab.—Ring Plover. "Ring-neck."

*Charadrius semipalmatus*, Aud., Birds Amer. v. 218, pl. 320.

*Ægialitis semipalmatus*, Cassin, Gen. Rep. 694.

The Ring Plovers are excessively abundant during the summer months along the whole coast of Labrador, which is one of their favorite breeding localities. On the first of September they had not yet left the country, being still as abundant as ever. When not separated into pairs for the purposes of reproduction, they frequent mostly sandy beaches and muddy flats, where they are found in loose straggling companies of from five or six to a dozen or more individuals, associated with the Semipalmated and Bonaparte's Sandpipers. They scatter widely apart while searching for food, running swiftly and gracefully over the sand, with the head lowered. They are at such times usually silent, except when disturbed, when they utter a loud mellow whistle on taking flight. Of all the smaller waders, none, with the exception of Bonaparte's Sandpiper, *Actodromas Bonapartei*, is so gentle and unsuspecting. They never seem to notice an approach of a few yards, and indeed I have sometimes found it difficult to force them to fly. They merely run swiftly a few steps, and then stand perfectly motionless, regarding the intruder in silence. The young run about as soon as hatched, and follow the parent, who leads them in search of food. They are at this time prettily mottled with black, light brownish and white, most of the under parts remaining of the latter color. Birds of the year may at all times be distinguished from the adults by the black of the bands being replaced by dull dirty ash.

No individuals of the *A. melodus* were observed in Labrador, nor did I find any indications of their presence there. From the fact of Audubon's finding them at the Magdalene Islands, it is to be supposed that they breed, sparingly at least, in the country.

*STREPSILAS INTERPRES* (L.) Ill.—Turnstone. "Chickling."

*Strepsilas interpres*, Aud., Birds Amer. v. 231, pl. 323. Cassin, Gen. Rep. 701.

The Turnstone I first observed at Henley Harbor, on the 20th of August, when the smaller waders generally had commenced their southern migration. How long they remain in the country I do not know, but on the 1st of September they were apparently as numerous as ever. Though not a very abundant species, I was enabled to procure a sufficient number of specimens, and to observe its curious habits. It afforded me much pleasure to notice with what dexterity they insert the bill beneath small stones and pebbles, and with a quick jerk turning them over, seize upon their prey lurking beneath. Though more shy and wary than the Sandpipers usually are, they did not seem to be as much so as the larger Tatlers. They are known to gunners by the name of "Chicklings."

*PHALAROPUS FULICARIUS* (L.) Bon.—Red Phalarope. "Bay-bird."

*Phalaropus fulicarius*, Aud., Birds Amer. v. 291, pl. 339. Cassin, Gen. Rep. 707.

Three specimens of this species were shot at sea, off Belle-Isle, from a flock of six. They were flying in a very compact body, much in the manner of the smaller Sandpipers, for which I at first mistook them. The sailors called them "Bay birds." While at sea we frequently saw this species, or the *P. hyperboreus*, resting gracefully on the water, particularly near masses of floating seaweed. Indeed, the Phalaropes, as a genus, are noted among all the smaller

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waders, both for their beauty and elegance of form, and their grace and activity of movement; whether running swiftly along the sandy shore, or swimming buoyantly on the water, or stepping lightly over the floating leaves of aquatic plants, their motions are equally pleasing. Their lobed feet make them perfectly at home on the water, and they are often seen at a considerable distance from land. The *fulcarius* and *hyperboreus* are both known by the uncouth and inappropriate, though curious name of "Sea-geese."

GALLINAGO WILSONI (Temm.) Bon.—Wilson's Snipe.

*Scolopax Wilsoni*, Aud., Birds Amer. v. 339, pl. 350.

*Gallinago Wilsoni*, Cassin, Gen. Rep. 710.

From the accounts of the natives, I should judge that the Snipe is abundant in Labrador, as it is in most parts of the United States. I met with but a single individual.

MACRORHAMPHUS GRISEUS (Gm.) Leach.—Red-breasted Snipe.

*Scolopax noveboracensis*, Aud. Birds Amer. vi. 10, pl. 351.

*Macrorhamphus griseus*, Cassin, Gen. Rep. 712.

I procured a single individual of this species in immature plumage on the 23d of August, but I learned nothing further respecting it than that it is known by the name of "Brown-back."

TRINGA CANUTUS Linn.—Red-breasted Sandpiper.

*Tringa islandica*, Aud. Birds Amer. v. 254, pl. 328.

*Tringa (Tringa) canutus*, Cassin, Gen. Rep. 715.

This large Sandpiper I met with for the first time at Henley Harbor, on the 21st of August, when the *Tringas* and small Waders generally had commenced their southerly migration. A few specimens were procured, in immature plumage, showing but slight traces of reddish on the under parts.

ACTODROMAS Kaup.

*Actodromas*, Kaup., Sk. Ent. Eur. Thierw. 1829. Typus *Tringa minuta* Leisl.

*Gen. char.* Bill about as long as, or very little longer than, the head, straight, slender, compressed, the tip very slightly expanded. Both mandibles deeply grooved to the expansion of the tip. Wings long; the first and second primaries about equal, the rest rapidly graduated; secondaries short, obliquely incised at the ends; tertials long, slender, flowing. Tail rather long, doubly emarginate, the central feathers projecting. Tibia bare for two-thirds the length of the tarsus. Tarsus about equal to the bill, and equal to the middle toe. Toes entirely free at base, and but very slightly margined. Hind toe very short.

The characters of this genus are well marked and decided, and are very different from those of *Tringa*, with which it is usually associated. In the latter, the bill is very stout, much expanded at tip, and considerably longer than the head or tarsus; the tertials short, thick and comparatively stiff; the tarsus is much longer than the toes, which are very short, stout and widely margined; the tibial feathers reach nearly to the joint, and the tail is nearly even, with the central feathers not projecting. The pattern of coloration is very different. In all these particulars of form and proportion, *Tringa* has very little similarity to *Actodromas*, which is well worthy of full generic rank. As already indicated, the essential characters of the latter lie in the proportions of the bill, tarsus and toe, which are of equal length, and in the doubly emarginate tail. Other features are found in the elongated tertials, long, much exposed tibiae, almost entire want of margins of the toes, &c. The known species are very similar in general pattern of coloration, all having the upper parts varied

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with deep brownish, light ashy and reddish; the breast and jugulum with an ashy or brownish suffusion, the rest of the under parts being white. All, except *A. Bonapartei*, and *A. Cooperi*, have a central blackish field on the rump. The genus comes nearest to *Pelidna* Cuvier, (Regn. Anim. 1817; type *T. cinclus*, L.) which, however, differs in the long decurved bill and some other peculiarities.

ACTODROMAS MACULATA (Vieill.) Cassin.—Pectoral Sandpiper. "Grass-snipe."

*Tringa pectoralis*, Aud., Birds Amer. v. 259, pl. 329.

*Tringa (Actodromas) maculata*, Cassin, Gen. Rep. 720.

The "Grass-snipe," as this species is most appropriately called, differs essentially in its habits from any other Sandpiper with which I am acquainted, except the *A. minutilla*. Between these two species, however, there is a striking similarity, both as regards form, color and general habits. I first noticed the Pectoral Sandpiper at Hlenley Harbor, on the 20th of August, when it had commenced its southern migration. I there found it abundant, and had ample opportunities both of observing its habits and procuring specimens.

This species is seldom or never seen on open sandy beaches, as it prefers at all times the low muddy flats laid bare by the tide, the pools and ditches which intersect them, and the salt marshes by which they are bordered. They are not restricted to the neighborhood of the sea, but frequent low wet meadows and fields at a great distance from any large body of water. There they walk slowly and sedately through the grass in search of food, having little or none of the restless activity which characterizes most Sandpipers. While thus engaged the tail is generally elevated, somewhat on the manner of the *Zenaidura Carolinensis*, if comparison can be made between two birds so dissimilar. This habit of frequenting meadows has gained for them their common appellation of "Grass-snipe." When they rise from the grass to alight again at a short distance, they do so in silence, or with a single "tweet," and fly slowly evenly, and with the wings deeply incurved. When, however, they are frightened, by being repeatedly forced up, or when they are suddenly startled, they spring vigorously, emitting loud rapidly repeated notes, and fly in a quick zigzag manner, like the common snipe. They are then equally difficult to shoot. On several occasions I have noticed a habit which this bird possesses, which I do not recollect of ever having seen stated. When suddenly startled they rise with a loud note, and mounting very high in the air circle over the head of the intruder for several minutes, flying with very great rapidity and in perfect silence. When about to alight, which they often do at the very spot from which they rose, they nearly close the wings, and dart suddenly down in an almost perpendicular direction. This curious habit I have also observed at Portsmouth, N. H., and frequently at Washington, D. C.

This species is found in pairs or singly, and never, I believe, in flocks of any extent. They are very tame and unsuspecting, permitting a near approach without becoming alarmed. In the fall they are excessively fat and delicately flavored, and afford delicious eating. Very little is known of their breeding places, or of their peculiar habits during the season of reproduction.

ACTODROMAS MINUTILLA (Vieill.) Coues.—Least Sandpiper. "Peep."

*Tringa minutilla*, Vieillot, Nouv. Dict. 1819, xxxiv. 466. Gray, Genera, 1849, iii. 579.

*Actodromas minutilla*, Coues, Monog. *Tring.* N. A., in Pr. A. N. S. Ph. July, 1861, 191.

*Tringa pusilla*, Wilson, Am. Orn. 1813, v. 32, pl. xxxvii. fig. 4; id. Brew. Ed. 1840, 347, fig. 161; id. Ord. Ed. 1829, iii. 134; nec Linnæi. Swainson, F. B. A. 1831, ii. 386. Audubon, Orn. Biog. 1834, iv. 180; id. Birds Amer. 1842, v. 280, pl. 337; id. Syn. 1839, 237. Giraud, Birds L. I. 1844, 240. Gray, Genera, 1849, iii. 579.

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*Pelidna pusilla*, Bonaparte, Comp. List, 1838, 50. Gosse, Birds Jamaica, 1847, 348.

*Tringa (Tringa) pusilla*, Bonaparte, Comp. Specch. 1827, 62.

*Tringa Wilsoni*, Nuttall, Manual, 1834, ii. 121. Cooper and Suckley, Nat. Hist. Wash. Terr. 1860, 240. Cassin, Pr. A. N. S. 1860, xiii. 196.

*Tringa (Actodromas) Wilsoni*, Cassin, Gen. Rep. 1858, 721.

Until very recently, great confusion has prevailed among the smaller Sandpipers; and even now, though the species are pretty well ascertained, the proper name applied to each, and their synonymy, are points which are not yet definitely settled. With regard to no name, however, has there been so much difficulty as to that of *Tringa pusilla* Linn., the proper locating of which has ever been a disputed point. Most authors have referred it to the bird which Wilson, in 1813, (Am. Orn. ut suprâ,) designated by that name, and which was subsequently, in 1834, dedicated to that naturalist by Nuttall, (Man. Orn. ut suprâ.) Audubon, in all his works, Gray, in his genera, and Bonaparte, in his earlier works, adopted the name of *pusilla* for the present bird. As early as 1825, however, Bonaparte was aware that the *T. pusilla* of Linnæus was not the bird that Wilson gave under that name; for, in his observations on Wilson's Nomenclature, pages 88, 89, on the subject of *Tringa semipalmata*, Wils., he says, "Several species have been confounded together under the name of *T. pusilla*; and although the present" (*T. semipalmata*, Wils.) "is the real species," &c. In 1858, Cassin (Gen. Rep. page 725) proved pretty conclusively that the *T. pusilla* of Linnæus, based upon the *T. cinclus dominicensis minor* of Brisson, is really the *Ereunetes petrificatus* of Illiger, though he does not change Illiger's specific name. This, however, he has recently done in the Proceedings of the Philadelphia Academy, (xii. 195, 1860,) where he gives the bird as *E. pusillus*.

The name of *pusilla*, then, being exploded for the species now under consideration, the question arises what specific name is to be applied to it. Later authors have mostly taken that of *Wilsoni*, given to the species in 1834, by Nuttall, who describes its habits so accurately that there can be no doubt as to what bird he has reference. But the claims of "Le tringa maringouin," *Tringa minutilla* of Vieillot (Nouv. Diet ut suprâ) to be the present species, appear to have been overlooked, or at least not generally conceded. Wilson, indeed, in his edition of Wilson, in 1840, quotes it, and Cassin, in the General Report in 1858, gives it as a synonym, but both with a query. But that *Tringa minutilla* really refers to the present species, there can be, I think, no reasonable doubt. Vieillot, page 466 of the Nouv. Dict., says of it, "Le nom que j'ai conservé à cet oiseau est celui sous lequel il est connu dans nos colonies de l'Amérique, et qui lui a été imposé d'après sa petite taille;" and after a description which applies well, he continues—"Il a des rapports avec le tringa minutu de Leisler," and adds, speaking of its habits, "Comme les tringas becos se comportent de même, il est résulté qu'on les a confondus ensemble." The description, especially with reference to size ("quatre pouces dix lignes") and to the length and proportions of the bill, ("noir, très grêle, et long de neuf lignes; les tarses de la même longueur,") will apply to no other species. Another evidence that this description has reference to the *Actodromas Wilsoni*, is the fact that the author recognizes *Tringa semipalmata*, Wils. "Le tringa demipalmé" as a totally distinct species. What the "tringa beco, *Tringa pusilla*, Lath.," of page 452 of the same work, refers to, is rather difficult to determine. Vieillot refers to the Am. Orn. plate 37, fig 4, which is *Tringa pusilla* of Wilson; but also quotes Brisson's "petite Alouette-de-mer de Saint-Dominique" which is *Ereunetes petrificatus* of the General Report. The description, however, applies best to the latter, which it may be well to consider it.

From the foregoing considerations, therefore, I cannot but adopt the specific name of *minutilla*, which has priority over *Wilsoni*, at least until weightier 1861.]

reasons are adduced on the opposite side of the question. With regard to the generic characters there is not the slightest difficulty. The bird presents the closest affinity to the type of the genus *Actodromas*, (*T. minuta* Leisl.,) and is very different from either *Tringa* or *Pelidna*, in both of which it has been placed.

This diminutive species, in form, color and general habits, is very closely allied to the preceding, of which it is in fact a perfect miniature. As far as my own observation extends, the same remarks with regard to the manners, voice, flight, &c., apply equally well to this species. It even possesses the curious habit mentioned under the preceding bird. Though so much smaller, its note is fully as loud and piercing. The chief difference is, that in the fall the Least Sandpipers collect in flocks of considerable extent, and that they are found on sandy beaches oftener than are the Pectoral Sandpipers. Nevertheless, its favorite situations are low muddy flats, and the ditches that intersect marshy and sedgy fields, where it finds an abundance of its favorite food. In Labrador I think I never observed them in any other situations. They search for food with remarkable industry and perseverance, carefully examining with their delicate bills every inch of ground they pass over; while thus engaged they may be approached within a few feet without showing any signs of fear. Together with the *A. Bonapartei* and the *Ereunetes pusillus*, they are known by the common name of "Peeps." On the first of September they had not left the country, being still abundant.

ACTODROMAS (HETEROPTYGIA) BONAPARTEI (Schl.) Cassin.—Bonaparte's Sandpiper. "Peep."

*Pelidna cinclus*, var. Say, Long's Exped. 1823, i. 172.

*Tringa Schinzii*, "Brehm." Bon. Syn. 1828. [Nec Brehm.] fide Gen. Rep.

Aud. Birds Amer. 1842, v. 275, pl. 335, et al. Auct. Amer.

*Tringa Bonapartei*, Schlegel, Rev. Crit. Ois. Eur. 1844, 89.

*Tringa (Actodromas) Bonapartei*, Cassin, Gen. Rep. 722.

*Actodromas (Heteropygia) Bonapartei*, Coues, Monogr. Tring. N. A., in Pr. A. N. S. Ph. July, 1861, 199.

Audubon, in his account of this species, remarks: "Those procured in Labrador were shot in the beginning of August, and were all young birds, apparently about to take their departure." I met it for the first time on the 30th of July; but on the first of September, when I left the country, they were still as numerous as ever. They are found in great abundance on the rocky shores of Labrador, where covered with sea-weed and interspersed with muddy flats and shallow pools, in which last the birds wade quite up to the breast. I have also frequently seen them in a situation where I never found any other Sandpiper—on the large masses of rock sloping down abruptly to the water, green and slippery from the continued falling of the spray. They seem to be very fond of these locations, and I seldom passed one without seeing several of these "peeps" running nimbly about; and I have actually approached within three or four feet of them, as they stood motionless regarding me with curious eye. Of all the Sandpipers this is the most gentle and unsuspecting; they seem utterly regardless of the presence of man, and do not intermit their occupation of searching for food, though the observer may be standing within a few feet of them. When startled they emit a low soft "weet" very different from that of any other Sandpiper, and fly off in a very compact flock. If a part of them be killed, the gunner may commit equal havoc with his second barrel, as after a few circlings they fly past, or alight again on the same spot. They fly rapidly, in a rather unsteady manner, alternately showing the under and upper parts; and they may always be recognized in flight by the conspicuously white upper tail coverts. They usually associate with the

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Semipalmated Sandpipers and the Ring Plovers, and in common with other small species are known by the general name of "Peeps." Those that I shot were not so excessively fat as the *A. maculata* and *Ereunetes pusillus* commonly are at the same season.

EREUNETES PUSILLUS (Briss.) Cassin.—Semipalmated Sandpiper. "Peep."

*Tringa cinclus dominicensis minor*, Brisson, Ornith. 1760, v. 222, pl. xxv. fig. 2, [haud dubiè.]

*Tringa pusilla*, Linnæus, Syst. Nat. 1766, i. 252, fide Gen. Rep.

? *Tringa pusilla*, Vieillot, Nouv. Dict. 1819, xxxiv. 452, [ad *T. cincl. dom. min.* Briss. refert.]

*Ereunetes petrificatus*, Illiger, Prod. 1811, 262. Cassin, Gen. Rep. 1858, 724.

*Tringa semipalmata*, Wilson, Am. Orn. 1813, vii. 131, pl. lxiii. fig. 4; id. Ord. Ed. 1829, iii. 132, pl. lxiii. fig. 4; id. Brewer, Ed. 1840, 542, fig. 225; ibid. Syn. 725. Vieillot, Nouv. Dict. 1819, xxxiv. 462; Diet. Class d'Hist. Nat. 1822, ii. 251. Swainson, F. B. A. 1831, ii. 381. Audubon, Orn. Biog. 1839, v. p. 110, pl. 408; id. Syn. 1839, 236; id. Birds Amer. 1842, v. 277, pl. 336. Giraud, Birds L. I. 1844, 239. Newberry, P. R. R. Surv. 1857, vi. 100.

*Ereunetes semipalmatas*, Cabanis, Schomburgk's Reise, iii. 758, fide Gen. Rep. Bonaparte, Compt. Rend. 1856, fide Gen. Rep. Cabanis, Journ. 1856, 419, fide Gen. Rep.

*Tringa (Hemipalama) semipalmata*, Bonaparte, Obs. Wils. 1825, num. 212; i l. Specch. Comp. 1827, 62.

*Tringa (Heteropoda) semipalmata*, Nuttall, Man. Orn. 1834, ii. 136.

*Hemipalama semipalmata*, Lambeye, Av. Cubae, 1850, 96.

*Hemipalama minor*, Lambeye, Av. Cubae, 1850, 97.

*Heteropoda semipalmata*, Bonaparte, Comp. List, 1838, 49. DeKay, N. Y. Fauna, 1844, 236, pl. 86, fig. 195. Gray, Genera, 1849, iii. 580.

? *Heteropoda mauri*, Bonaparte, Comp. List, 1838, 49.

*Ereunetes mauri*, Cabanis, Journ. 1856, 419, fide Gen. Rep.

*Tringa brevirostris*, Spix, Aves Bras. 1825, ii. 76, fide Gen. Rep.

? *Pelidna Brissoni*, Lesson, Man. d'Ornith. 1828, ii. 277, [T. pusillum, Linn. citat.]

*Ereunetes pusillus*, Cassin, Proc. Acad. Nat. Sc. 1860, xiii. 195. Coues, Monog. Tring. N. A., in Pr. A. N. S. Ph. July, 1861, 177.

The statements made under the head of *Actodromas minutilla*, tending to demonstrate that *Tringa pusilla* of Linnæus is not the bird given under that name by Wilson, also prove that the name really belongs to the species now under consideration. As there stated, *pusilla* was applied by Linnæus in 1766 to the bird figured and described by Brisson, (Ornith. 1760, v. p. 222, pl. xxv. fig. 2,) under the appellation of "La petite Alouette-de-mer de S. Dominique," *Tringa cinclus Dominicensis minor*. The description applies well, and the figure plainly shows the webbing of the toes, a feature which exclusively characterizes this species among the smaller Sandpipers. There being no reasonable doubt, therefore, of what *pusilla* really refers to, it must, according to the laws of nomenclature, take precedence over both *petrificatus* of Illiger, and *semipalmatus* of Wilson. Cassin restores the name in the Proceedings of the Academy of Natural Sciences, above cited, there calling the bird *Ereunetes pusillus*, though in the General Report he retains the specific name of *petrificatus* bestowed by Illiger in 1811.

The webbed feet of this bird were very early made the grounds for generic distinction from *Tringa*, to which they would fully entitle it, even were no other characters involved. But though several genera have been proposed for it, fortunately there is not the slightest difficulty as to the proper one to be employed. *Heteropoda* of Nuttall, (1834,) and *Hemipalama* of Bonaparte, (1825,) must both yield to *Ereunetes petrificatus*, which, according to the Gene-1861.]

ral Report, has been proved to be the *T. semipalmata* of Wilson, by actual examination of the type specimen. This being the case, *Ereunetes* must be used in the present connection, though for the reasons given above, *petrificatus* cannot be retained. The cause of Nuttall's proposing for the bird a new genus was probably the fact that Bonaparte in 1828 employed his *Hemipalama* in connection with a very different bird—the *Micropalama himantopus* of Baird—with which it has scarcely a generic character in common except the webbed toes. As a reference to the article will show, the name was proposed for, and first used in connection with, the *T. semipalmata* Wils.

I have thought it well to present the synonymy of this species, since, as will be seen, it has received a great variety of names. According to the General Report, the *Heteropoda Mauri* of Bonaparte, or the *Ereunetes Mauri* of Cabanis, is merely a large race of the present bird; while the remarkable variations in the length of the bill, to which the species is subject, have given rise to the *Hemipalama minor* of Gundlach, and the *Tringa brevirostris* of Spix. *Pelidna Brissoni* of Lesson is probably this species, since he refers to *Tringa pusilla* of Linnaeus.

No individuals of this species were observed until the latter part of July, but soon after that date they became excessively abundant, and continued so during the month of August. When on muddy flats I generally found them associated with the Ring Plovers and Bonaparte's Sandpipers; but when on open sandy beaches they keep mostly to themselves, sometimes in flocks of great extent, the other species with which they principally mix not generally frequenting such situations. When in large flocks dozens may be killed at a shot; and as, after many wheelings, they often alight again on the same spot, they afford a second opportunity to the gunner. When wounded, they swim with considerable ease, aided by their semipalmated feet; but they are not capable of diving to any extent. These birds, possessing very few distinctive traits of habit among the smaller Sandpipers, are yet remarkable in one particular—the great facility with which they may be decoyed by imitating their call—a low mellow whistle. When skilfully executed, I have seen them approach within a few feet of the person seated on a rock in full view, though a moment after, on discovering their mistake, they would immediately take flight. They are also noted for the excessively fat condition in which they are always found in the fall, exceeding that of almost any other bird of their family. In this state they are delicious eating, being tender, juicy and delicately flavored, but on account of their diminutive size they are not much sought after. This species is the "Peep" *par excellence*, though the *Actodromas Bonapartei* and *minutilla* are also known by the same name.

GAMBETTA MELANOLEUCA (Gm.) Bon.—Tell-tale. "Yellow-legs."

*Totanus vociferus*, Aud., Birds Amer. v. 316, pl. 345.

*Gambetta melanoleuca*, Cassin, Gen. Rep. 731.

This large tatter, so well known and so universally disliked by all gunners on account of its watchful and noisy nature, is a very common bird along the coast of Labrador during the summer and early fall. During the fore part of the summer I found them very wary and difficult of approach. They would stand motionless and in silence, regarding me with watchful attention until I was nearly within shooting distance, when, at a single note from one of the flock, all would instantly take flight, emitting their loud and clear whistling, as if rejoicing at my discomfiture. By the middle of August, however, they seemed to have laid aside their watchfulness, and numbers were procured without difficulty. Though found in all situations near the water, their favorite localities seemed to be the muddy flats laid bare by the tide, the salt marshes adjoining them, and the pools which dot these marshes. They are seldom found in good condition for the table, being generally very lean. They are known altogether as "Yellow-legs."

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TRINGOIDES MACULARIUS (L.) Gray.—Spotted Sandpiper. "Teeter-tail."

*Totanus macularius*, Aud., Birds Amer. v. 303, pl. 342.

*Tringoides macularius*, Cassin, Gen. Rep. 735.

The Spotted Sandpiper forms almost the only exception to the general rules, that the species of this family retire to very high latitudes to rear their young, and on their return south in the fall associate in flocks of greater or less extent. It has a breeding range almost unparalleled among the Sandpipers, rearing its young from as far south, at least, as Washington, D. C., to the confines of the Arctic circle. Nor is it confined to the immediate vicinity of the sea; it abounds along the rivers and creeks of the interior, and shows a marked predilection for the vicinity of man's abode. The nest is usually placed in an orchard or meadow, often in a ploughed field, and is a mere depression in the ground, lined with a few dried grasses, or a little eel-grass, (*Zostera*.) The eggs, as usual in this family, are four in number, large for the size of the bird, pointed, and of a light cream color, every where blotched and spotted with dark brown and black. A nest found on the 4th of July, on one of the barren islands off the coast of Labrador, contained eggs in which the embryos had scarcely begun to be developed, while on the 17th of June, eggs found at Portsmouth, N. H., were on the point of hatching.

The Spotted Sandpiper is at all times a solitary species; it is rare to see more than two or three together. Its note is a low mellow "weet," often repeated. When wounded, even if very severely, it dives with great facility and quickness, and sometimes swims a considerable distance under water. Its most peculiar trait, however, is the habit it possesses of always, on alighting, and frequently at other times, balancing its tail in a remarkable manner, just as the Solitary Sandpiper, *Rhyacophilus solitarius*, does its head. This peculiarity has gained for it the common appellation of "Teeter-tail."

TRINGITES RUFESCENS (Vieill.) Cab.—Buff-breasted Sandpiper.

*Tringa rufescens*, Aud., Birds Amer. v. 264, pl. 331.

*Tringites rufescens*, Cassin, Gen. Rep. 739.

A single specimen of this rather uncommon Sandpiper was shot on the 20th of August by one of the sailors, but was unfortunately too much mutilated to be preserved. I learned nothing of its habits; it is probably a rare bird in Labrador.

NUMENIUS (NUMENIUS) LONGIROSTRIS Wils.—Long-billed Curlew. "Sickle-bill."

*Numenius longirostris*, Aud., Birds Amer. vi. 35, pl. 355. Cassin, Gen. Rep. 743.

Although I did not meet with this species myself, I was assured by all the hunters that it is occasionally seen among the vast flocks of the *N. borealis* that appear in the autumn. It is, however, rare in Labrador. It is known by the very suggestive name of "Sickle-bill."

NUMENIUS (PHÆOPUS) HUDSONICUS Lath.—Hudsonian Curlew. "Jack Curlew."

*Numenius Hudsonicus*, Aud., Birds Amer., v. 42, pl. 356. Cassin, Gen. Rep. 744.

Of the Hudsonian Curlew I saw but few individuals, and these were so shy that it was with difficulty that they were procured. They were most numerous at the time that the *N. borealis* were about taking their departure; and in their general manners, food, &c., appeared to be very similar to the latter. Their voice, however, is much louder and rougher. They are known to the natives as "Jack Curlews."

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NUMENIUS (PHAEOPUS) BOREALIS (Forst.) Lath.—Esquimaux Curlew. “The C’lew.”

*Numenius borealis*, Aud. Birds Amer., vi. 45, pl. 357. Cassin, Gen. Rep. 744.

From the time of my first arrival in the country until the second week in August, the stereotyped reply of the inhabitants to my inquiries concerning game was, “There is nothing to shoot yet, sir; the C’lews have not yet arrived; but when they come you will have fine sport.” All were agreed as to the abundance of the birds, the facility with which they could be obtained, the sport of killing them, and their delicacy on the table. Naturally enough, when disappointed in procuring other birds, our thoughts turned to the Curlews, and we endeavored to console ourselves by shooting them in anticipation. It was not, however, until the 16th of August, when in the romantic harbor of “Indian Tickle,” that we obtained the first glimpse of the Curlews. Five days later, at Henley Harbor, our sport commenced; the Curlews were there in immense numbers, and for nearly two weeks we all enjoyed such sport as almost made us forget our disappointments and hardships on the dreary Labrador coast. The Curlews then disappeared as suddenly as they had arrived; not, however, until I had had ample opportunities of studying their habits, and had procured a sufficient number of specimens.

The Esquimaux Curlew arrived on the Labrador coast from its more northern breeding grounds in immense numbers, flying very swiftly in flocks of great extent. These immediately broke up into smaller companies, and proceeded at once in search of food. They remained but a very short time. As Audubon most correctly says, “I was not long in discovering that their stay on this coast was occasioned solely by the density of the mists, and the heavy gales that already gave intimation of the approaching close of the summer; for whenever the weather cleared up a little, thousands of them set off and steered in a straight course across the broad Gulf of St. Lawrence. On the contrary, when the wind was high and the fogs thick, they flew swiftly and low over the rocky surface of the country, as if bewildered. Wherever there was a spot that seemed likely to afford a supply of food, there the Curlews abounded and were easily approached.” His observations, however, differ much from mine, in reference to the time of the arrival and departure of the birds. He states that they made their first appearance on the 29th of July, and had all left by the 12th of August; whereas, I saw none until about that latter date, and none were to be seen on the first of September. For two or three days before their final departure, we had noticed them all moving directly southward, flying very high in the air in loose straggling flocks, with a broad extended front.

The Curlews associate in flocks of every size, from three to as many thousands, but they generally fly in so loose and straggling a manner, that it is rare to kill more than half a dozen at a shot. When they wheel, however, in any of their many beautiful evolutions, they close together in a more compact body, and offer a more favorable opportunity for the gunner. Their flight is firm, direct, very swift, when necessary much protracted, and is performed with rapid regular beats. They never sail except when about to alight; then the wings are much incurved downwards, in the manner of most Waders. As their feet touch the ground their long, pointed wings are raised over the back until the tips almost touch, and then deliberately folded, much in the manner of the Solitary Sandpiper, *Rhyacophilus solitarius*. Their note is an oft-repeated, soft, mellow, though clear whistle, which may be easily imitated. By this means they can readily be decoyed within shot, if the imitation is good and the gunner is careful to keep concealed. The smaller the flock, the more easily are they allured, and a single individual rarely fails to turn his course toward the spot from whence the sound proceeds. When in very extensive flocks they have a note which, when uttered by the whole number, I can compare to nothing but the chattering of a flock of blackbirds. When wounded and taken in hand, they emit a very loud harsh scream, like that

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of a common hen under similar circumstances, which cry they also utter when pursued.

Their food consists almost entirely of the Crow-berry, *Empetrum nigrum*,\* which grows on all the hill-sides in astonishing profusion. It is also called the "Bear-berry" and "Curlew-berry." It is a small berry, of a deep purple color, almost black, growing upon a procumbent, running kind of heath, the foliage of which has a peculiar moss-like appearance. This is their principal and favorite food; and the whole intestine, the vent, legs, bill, throat, and even the plumage are more or less stained with the deep purple juice. They are also very fond of a species of small snail, that adheres to the rocks in immense quantities, to procure which they frequent the land-washes at low tide. Food being so abundant, and so easily obtained, they become excessively fat. In this condition they are most delicious eating, being tender, juicy, and finely flavored; but as might be expected, they prove a very difficult job for the taxidermist.

Although the Curlews were in such vast numbers, I did not find them so tame as might be expected, and as I had been led to suppose by previous representations. I was never able to walk openly within shooting distance of a flock, though I was told it was often done. The most successful method of obtaining them is to take such a position as they will probably fly over in passing from one feeding ground to another; they may then be shot with ease, as they rarely fly high at such times. The pertinacity with which they cling to certain feeding grounds, even when much molested, I saw strikingly illustrated on one occasion. The tide was rising and about to flood a muddy flat of perhaps an acre in extent, where their favorite snails were in great quantities. Although six or eight gunners were stationed on the spot, and kept up a continual round of firing upon the poor birds, they continued to fly distractedly about over our heads, notwithstanding the numbers that every moment fell. They seemed in terror lest they should lose their accustomed fare of snails that day. On another occasion, when the birds had been so harassed for several hours as to deprive them of all opportunity of feeding, great numbers of them retired to a very small island, or rather a large pile of rocks, a few hundred yards from the shore, covered with sea weed, and, of course, with snails. Flock after flock alighted on it, till it was completely covered with the birds, which there, in perfect safety, obtained their morning meal.

I was told that the Curlews were never seen in Labrador, except for the short period in the autumn. Such, however, I do not think to be the case, particularly as Audubon, upon good authority, asserts to the contrary. It is probable that the celerity and silence with which it passes northward during the spring migration, causes it to be partially overlooked. Its migrations are very extensive, but performed so quickly and silently that it is rarely seen south of the New England States. It is found in Texas; though as far as my knowledge extends, it does not breed much south of Hudson's Bay. In Labrador it is known by its proper name, which, however, is invariably shortened into "C'lew." Further south it is called the "Dough-bird;" but this name is also applied to other birds. In a great number of specimens I found considerable differences in size, in the color of the under parts, which varies from creamy white to deep buff, and in the purity and extent of the white patch on the throat. These differences, however, were not indicative of sex, nor even of age, so far as I could ascertain.

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\* "EMPETRUM, Tourn. Flowers polygamous, scattered and solitary in the axils of the leaves, (inconspicuous) scaly-bracted. Calyx of 3 spreading and somewhat petal-like sepals. Stamens, 8. Style very short; stigma 6-9 rayed. Fruit, a berry like drupe, with 6-9 seed-like nutlets, each containing an erect anatropous seed, *E. nigrum*, L. Procumbent and trailing; leaves linear oblong, scattered; fruit black."—(Gray's Manual of Botany, Collège Ed. p. 393.)

## BERNICLA CANADENSIS (L.) Boie.—Canada Goose.

*Anser Canadensis*, Aud., Birds Amer. vi. 178, pl. 376.

*Bernicla Canadensis*, Baird, Gen. Rep. 764.

No Wild Geese were observed until the second week in August, when for several days we saw them fly southward in small flocks, keeping at a great height in the air, and always preserving a wedge-shape form. No specimens were procured.

## ANAS BOSCHAS Linn.—Mallard.

*Anas Boschas*, Aud., Birds Amer. vi. 236, pl. 385.

Baird, Gen. Rep. 774.

Audubon, in his account of this Duck, says "On the western coast of Labrador, none of the inhabitants we conversed with had ever seen the Mallard, and in Newfoundland the people were equally unacquainted with it, the species being in those countries replaced by the Black Duck, *Anas fusca*." Although it is a rare species in Labrador, I ascertained its existence there from a very fine pair offered for sale by one of the natives. In the interior of the continent it goes as far north at least as Great Slave Lake, where it breeds in considerable numbers.

## ANAS OBSCURA Gm.—Dusky Duck. "Black Duck."

*Anas obscura*, Aud., Birds Amer. vi. 244, pl. 386.

Baird, Gen. Rep. 775.

The Dusky Duck is by far the most abundant of the *Anatine* along the coast of Labrador, where it breeds very plentifully. Though some times seen along the rocky and barren islands that skirt the coast, it at all times shows a decided preference for the ponds and streams of the interior. When the females are incubating, and engaged in rearing their young, the males desert them, and retire to secluded situations to renew their feathers. Some which I shot on the 23d of July were at that time in deep moult, and entirely unable to fly, though they made their way over the water with astonishing celerity. I saw young nearly half grown on the 1st of August; they were at that time still led about by the parent, and were unable to fly. It is a remarkably shy and watchful bird, so much so that it is only with great difficulty it can be procured. It is much esteemed as an article of food, and is known to the inhabitants as the "Black Duck."

## NETTION CAROLINENSIS (Gm.) Baird.—Green-winged Teal.

*Anas Carolinensis*, Aud., Birds Amer. vi. 251, pl. 392.

*Nettion Carolinensis*, Baird, Gen. Rep. 777.

Though the Green-winged Teal is a rare bird along the coast of Labrador, yet Audubon is incorrect in saying that it is never found there. A specimen which I saw in a collection of birds at Rigolet, proves its existence in that country. It is abundant in the interior, breeding in the region around Great Slave Lake.

## NETTION CRECCA (L.) Kaup.—English Teal.

*Nettion crecca*, Baird, Gen. Rep. 778.

I was so fortunate as to procure a well characterized specimen of this Teal, which, though a common bird in Europe, is only known in North America as a rare straggler from that country. It is closely allied to the Green-winged Teal, but is nevertheless perfectly distinct, the differences being readily appreciable even without comparison. These consist in the entire absence of the white crescent before the wing; the more conspicuously colored elongated scapulars, which are deep black and pure creamy white; and the remarkable distinctness of the white lines on the head. I learned nothing of its habits.

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CAMPTOLEMUS LABRADORIUS (Gm.) Gray.—Labrador Duck. "Fool-bird."

*Fuligula Labradorica*, Aud., Birds Amer. vi. 329, pl. 400.

*Camptolemus Labradorius*, Baird, Gen. Rep. 803.

I did not succeed in procuring or even meeting with this rare and very remarkable Duck. I was informed that, though it was very rarely seen in the summer, it is not an uncommon bird in Labrador during the fall; it is known by the peculiar appellation of "Fool-bird," a name given on account of its remarkably unsuspecting nature, which renders it easy to approach. The name, however, can scarcely be a general one. Further than this I learned nothing respecting it.

PELIONETTA PERSPICILLATA (L.) Kaup.—Surf Duck. "Bottle-nosed Coot."

*Fuligula perspicillata*, Aud., Birds Amer. vi. 337, pl. 402.

*Pelionetta perspicillata*, Baird, Gen. Rep. 806.

The Surf Duck is an abundant bird along the coast of Labrador, where a good many breed, though perhaps a greater number go still further north. They are seen in flocks of considerable extent, especially during the renewal of their feathers, at which time they collect in great numbers along the shores of the bays and inlets. On the 3d of August, while sailing up Esquimaux Bay, the shore for nearly a mile was lined with these Ducks, and the succeeding species. They were all in deep moult, and most of them unable to fly, and yet were so wary and vigilant, that few were obtained, for they dived at the flash of the gun with such celerity as to escape the shot. They are tough birds, and remarkably tenacious of life, and require a heavy charge to kill them. Those procured were excessively fat, but their flesh was rank and oily. They are known as "Bottle-nosed Coots," a name given in allusion to the very peculiar shape and color of the bill.

MELANETTA VELVETINA Baird.—Velvet Duck. "White-winged Coot;" "Brass-winged Diver."

*Fuligula fusca*, Aud., Birds Amer. vi. 332, pl. 401.

*Melanetta velvetina*, Baird, Gen. Rep. 805.

This species is nearly if not quite as abundant as the preceding, with which it is often found associating. It appears to possess much the same habits. It is a very shy and vigilant species, and possesses powers of diving surpassed by few birds. It is known by the names of the "White-winged Coot" and "Brass-winged Diver," the former being the most usual appellation.

Though I did not meet with the American Scoter, *Oidemia Americana*, I was assured that it breeds in the neighborhood of Esquimaux Bay. It is known as the "Black Coot" and "Butter-billed Coot." The three species of *Oidemia* are all called "Coots;" a nomenclature that puzzled me not a little, until I ascertained to what birds the names referred.

SOMATERIA MOLLISSIMA (Linn.) Leach.—Eider Duck. "Sea-duck."

*Fuligula mollissima*, Aud., Birds Amer. vi. 349, pl. 405.

*Somateria mollissima*, Baird, Gen. Rep. 809.

The Eider Duck, so widely and justly celebrated for the valuable down which it furnishes in such quantity as to make it a profitable article of commerce, is the most abundant Duck throughout the extent of Labrador, which is with it a favorite breeding place. For although many breed in very high latitudes on both sides of the Atlantic, yet Labrador, from the peculiar nature of its coast, seems a country specially adapted to its wants. It also finds there a safer place of retreat while engaged in the duties of incubation, since, at least as far as I can ascertain, its down is not so regularly sought for as it is in some other countries. Wherever found at all it is an abundant species; but on the American coast it is seldom or never seen south of Long Island or the New Jersey Capes.

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The Eiders choose for their breeding places the low, rocky, barren islands that stud the Labrador coast, generally giving the preference to those which are more or less covered with grass and low scrubby juniper. The nests are always placed on the ground; often a tuft of grass is selected, or the nest is hidden beneath the spreading boughs of juniper. The grassy crevices between flat strata, and the soft beds of moss at the foot of over-shadowing rocks are also favorite situations. The nest is of rather bulky construction, formed of moss, lichens, and dried grasses and seaweed, loosely matted together, and the whole fabric sunk as deeply as possible into the ground. The down is seldom, I think, added until the full complement of eggs is made up. These rarely exceed five or six in number, and occasionally are but four. They vary much in size and shape, and also considerably in color. They average about three inches in length by two in breadth, and the shape varies from an almost perfect ellipse to a regular ovoid or ovate. The ground color is a dull olive green, frequently with a bluish, and sometimes with a creamy tinge; and is often discolored with darker patches, like stains. The shell is smooth and polished. The eggs are excellent eating, as I know to my cost; for having on one occasion collected a large basketful, all those that were fresh and could be neatly blown, were appropriated by the sailors during a temporary absence.

While the female is incubating she permits a very near approach before she forsakes her nest; it is not uncommon to walk up to within a few feet of the sitting bird; she then flaps off in a hurried frightened manner, but always in silence, and makes directly for the nearest water. If a gun be fired on a small island, where many birds are sitting, all immediately leave their nests and collect in a body at some distance on the water. There they wash and plume themselves until the intruder withdraws, when they soon resume their duties.

There seems to be considerable difference in the time of laying the eggs. On the 4th of July, when I made most of my observations on these birds, I found nests in which the full complement had not yet been laid; eggs with chicks in all stages of development; and broods of young were seen, led about on the water by the parent. As soon as the ducklings are hatched, they are led directly to the water, where they swim with perfect ease and dive with facility. The mother keeps them close about her, anxiously watching for every appearance of danger that might befall them, and ready at any moment to give battle to any hungry gull that might attack them. Under these circumstances only did we ever succeed in openly rowing within shot of an Eider, when anxiety for the safety of her brood made her forget her own danger. On such occasions, the mother, keeping them close together, would urge them forward until the danger became too imminent, when at a single note, the young would scatter and dive with astonishing celerity, and the mother dive or fly off as necessity required. The ducklings at this time are covered with long hair-like down, very fine, of a dusky brown above and light silvery grey below.

As soon as the females begin to deposit their eggs, they are deserted by the males, and from this time the whole care of incubation and rearing the young devolves upon the former. The males, at this season, assemble in large flocks, and retire to the outer and most secluded islands during the time of the renewal of their feathers. They are excessively shy and difficult to approach. The females, even those which are sterile, never, I believe, associate with the males, but keep in flocks by themselves.

There is a great difference in the colors of the plumage of the females at different ages, varying from very light ochreous to a uniform dark chestnut brown, much as represented in Audubon's plate. They are universally known as "Sea-ducks," the males being always distinguished as "Sea-drakes." I seldom or never heard the name of Eider applied to either sex by the natives.

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I saw no individuals of the King Eider, *Somateria spectabilis*, during my stay; but was informed that in the fall they are not unfrequently met with.

MERGUS SERRATOR Linn.—Red-breasted Merganser. "Shell-drake."

*Mergus serrator*, Aud., Birds Amer. vi. 395; pl. 412. Baird, Gen. Rep. 814.

The Red-breasted Merganser breeds very abundantly along the Labrador coast, while the Buff-breasted, *M. Americanus*, is seldom or never seen. The females place their nests on much the same islands as the Eiders choose, but conceal them more carefully in the tall grass, or among thick scrubby juniper. The nest is rather neatly and compactly formed of mosses, lichens, and dried sea weeds, and warmly lined with down plucked from the breast of the mother, with which the eggs are nearly covered. The full number of these is nine or ten; incubation does not take place until late in the season, as I have found them nearly fresh on the 4th of July. They are regularly oval or ellipsoidal in form, and of a uniform light buff color. When the bird is surprised on the nest, she steals off as quietly as possible, and retires to a considerable distance. While the females are engaged in incubation, and in rearing their young, the males collect in small flocks and keep entirely by themselves, and are excessively shy and vigilant. I found young birds, apparently about a week old, on the 1st of August. Although so young, they were perfectly at home on the water, swimming with ease and grace, and diving with such celerity that it was with difficulty that three or four were procured.

GRACULUS DILOPHUS (Sw.) Gray. Double-crested Cormorant. "Shag."

*Phalacrocorax dilophus*, Aud., Birds Amer. vi. 423; pl. 416.

*Graculus dilophus*, Lawrence, Gen. Rep. 877.

As I had no opportunity of visiting any of the colonies of Cormorants, either in Labrador or Newfoundland, I can say nothing concerning their habits. I was informed that there was a "Shag settlement" (either of this species or the *G. carbo*,) near Sloop Harbor, a short distance south of Little Mecattina. A fine specimen of this species was presented to me by Capt. Dodge. Both this and the *G. carbo* are universally known as "Shags."

SULA BASSANA (L.) Briss.—Gannet.

*Sula bassana*, Aud., Birds Amer. vii. 44; pl. 425. Lawrence, Gen. Rep. 871.

On the first of July our proximity to the celebrated Gannet Rocks was clearly indicated by the numbers of these birds seen flying in every direction, engaged in seeking for food, which consists principally or wholly of fish. When satiated with food they are unable to fly for some time. We passed by one in this condition; it flapped heavily along on the surface of the water, trying in vain to rise, yet managing, with aid of wings and feet to proceed with considerable speed. Again, on the 11th of September, on our return we saw many Gannets; but though on both these occasions we passed within fifty miles or less of the rocks, I was denied the pleasure of observing the birds at their great breeding place, and can only speak of their flight and mode of fishing. They fly with firm, powerful beats, alternately sailing and flapping for about equal distances, and their flight is strong and capable of being greatly protracted. When searching for food, they fly slowly along at the height of a few yards above the surface, reconnoitering the water beneath. When a fish is espied, the bird poises an instant in the air and then darts suddenly down, the weight of its ponderous body giving it an impetus which sends it far under water, and raises the spray in a cloud around it. Taking advantage of this habit, Gannets are sometimes captured by fastening a fish to a soft plank, and sinking it just below the surface. The velocity with which the bird descends forces its bill through the wood, and it is thus made a prisoner.

## PROCELLAIRA (FULMARS) GLACIALIS Linn.—Fulmar Petrel.

*Procellaria glacialis*, Aud., Birds Amer. vii. 204; pl. 455. Lawrence, Gen. Rep. 825.

On the 19th of August, while at sea off Belle-Isle, many Fulmars were seen, mostly resting on the water in companies of about a dozen. They generally remained quiet until we approached within sixty or seventy yards, when they would all take flight. In rising from the water the wings are lifted high over the back, the feet drawn under the belly, and with one vigorous spring and a flap at the same instant, the bird launches itself into the air. Its flight is extremely firm, vigorous and protracted, performed with slow measured beats. One individual was overtaken by our vessel, so loaded with food as to be unable to fly; it passed close by the side swimming as fast as possible, near enough to enable me to clearly discern the peculiar character of the nostrils which distinguishes this family of birds.

THALASSIDROMA (OCEANITES) WILSONI Bon.—Wilson's Stormy Petrel. "Mother Carey's Chickens."

*Thalassidroma Wilsoni*, Aud., Birds Amer. vii. 223; pl. 460. Lawrence, Gen. Rep. 831.

Many of these little oceanic wanderers, and probably also the *Thal. Leachii*, and *pelagica*, were seen every day during our voyage, until we entered the Gulf of St. Lawrence. After that few were observed, and none at all seen off the coast of Labrador. They probably breed along the coast of Nova Scotia. They are very familiar unsuspecting little birds, fluttering hither and thither close around a vessel to pick up the bits of floating garbage which forms their favorite food, and never showing the slightest fear. When about to pick up any floating substance, they raise the wings high over the back, flapping them lightly, and stretch the feet downwards to their fullest extent; the moment they touch the water, the morsel is secured, and the bird is off again in an instant. This attitude is represented to the life in Audubon's beautiful plate of the Least Petrel. Their flight is light, graceful and buoyant in the extreme, and their power of remaining long at a time on the wing is unsurpassed. Three or four are generally seen at a time, though when pressed by hunger they sometimes collect in great numbers about a vessel, eagerly searching for food. On one occasion, about dusk in the evening, we came upon a company of about thirty of them, collected together in a compact flock, sporting high in the air with most graceful movements, like so many swallows over a pond. What had attracted them I could not ascertain. These birds may be caught by means of a hook baited with a morsel of pork; but such is the antipathy of sailors to destroying them, that they are seldom molested. I am informed by my friend, Dr. H. Bryant, of Boston, that he has caught them by allowing a long filament of silk to float in the air behind a sailing vessel, with which the wings of the birds become entangled as they flutter against it. All three species of Petrels are universally known as "Mother Carey's Chickens."

PUFFINUS (AR DENNA) MAJOR (Faber) Bon.—Greater Shearwater. "Hagden."

*Puffinus cinereus*, Aud., Birds Amer. vii. 212, pl. 456.

*Puffinus (Ardema) major*, Lawrence, Gen. Rep. 833.

Many Shearwaters were seen at different times during the voyage, generally singly, and always at a distance from land. They appeared to be shy and unfamiliar birds, none approaching near enough to enable me positively to determine the species, whether *P. major* or *anglorum*, though from their size I should suppose the former. On the 19th of August many were seen resting on the water in companies, in the manner of the Fulmars, *Procellaria glacialis*, to which they are nearly allied, both in form and general manners. Both species are known to sailors and fishermen as "Hagdens."

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PUFFINUS (NECTRIS) FULIGINOSUS Strickl.—Sooty Shearwater. "Black Hagden."

*Puffinis (Nectris) fuliginosus*, Lawrence, Gen. Rep. 834.

On the 19th of August a few individuals of this easily recognizable species were seen in company with the *P. major*, to which in their habits they are probably very similar. They are known to the sailors as "Black Hagdens."

STERCORARIUS POMARINUS Temm.—Pomarine Jaeger. "Boatswain."

*Lestris pomarinus*, Aud., Birds Amer. vii. 186, pl. 451.

*Stercorarius pomarinus*, Lawrence, Gen. Rep. 838.

But very few individuals of this species were observed. I shot one which was hovering over the stern of the vessel, attracted by some floating garbage. I was surprised to see that it picked up floating substances more in the manner of a Petrel than of a Gull—descending slowly with the feet stretched downwards, and wings elevated, and scarcely touching the water. This Jaeger is known to sailors and fishermen as the "Boatswain," a name which is also applied to the *S. parasiticus*.

STERCORARIUS PARASITICUS Temm.—Arctic Jaeger. "Boatswain."

*Lestris Richardsonii*, Aud., Birds Amer. vii. 190, pl. 452.

*Stercorarius parasiticus*, Lawrence, Gen. Rep. 839.

I saw but a single individual of this species that I could identify with any certainty. It may be recognized in flight by the peculiar shape of its tail, intermediate between that of *S. pomarinus* and *cepphus* in the length of the middle tail feathers, which project some three inches beyond the others. The name of "Boatswain" is applied to this species as well as to the preceding. All the Jaegers have received from the fishermen two very appropriate epithets, in allusion to the peculiar nature of their food, which, as is well known, consists principally of the partially digested fish which they force the Gulls to disgorge.

STERCORARIUS CEPPHUS (Brünn.)—Buffon's Skua. "Marlingspike."

*Lestris parasitica*, Aud., Birds Amer. vii. 192, pl. 453.

*Stercorarius cepphus*, Lawrence, Gen. Rep. 840.

Of this most beautiful and graceful of the Jaegers I saw but very few individuals, and those only while at sea. It is easily recognized by the long slender feathers, which project six or eight inches beyond the others. From this peculiarity it has received the name of "Marlingspike" from the sailors. Its flight is extremely powerful, firm, even, and performed with regular beats, which propel it with great velocity. It never, I believe, sails. I had not the pleasure of witnessing its attacks upon the Gulls, in which it is said to display courage and intrepidity beyond all other species of the genus.

LARUS GLAUCUS Brünn.—Glaucous Gull. "Ice-gull."

*Larus glaucus*, Aud., Birds Amer. vii. 170, pl. 449. Lawrence, Gen. Rep. 842.

I saw but very few "Burgomasters" that I could positively identify, on the coast of Labrador, where they appear to be rather rare. They are probably more abundant in higher latitudes. I was informed by an intelligent hunter, who seemed to be acquainted with all the large birds, that there was a "colony" of the "Ice-gulls," as they are called, on some small islands known as the Herrings, about twenty-five miles off the coast, just opposite the entrance of Esquimaux Bay. Unfortunately, however, I had no opportunity of verifying the statement, or of observing the habits of this magnificent Gull during the breeding season.

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LARUS MARINUS Linn.—Great Black-backed Gull. "Saddle-backed Gull."  
"Saddler."

*Larus marinus*, Aud., Birds Amer. vii. 172, pl. 450. Lawrence, Gen. Rep. 844.

The Great Black-backed Gull, which, with the single exception of the Glaucous Gull, is the most powerful of its tribe, is a very abundant bird during the summer months along the whole coast of Labrador. Indeed, this is almost the only locality on this side of the Atlantic where its habits during the breeding season can be successfully studied; the peculiar character of the coast renders it well adapted to the wants of the birds, and it is therefore their favorite breeding place. I was informed that it arrives there about the latter part of May, but with reference to its time of departure, I cannot reconcile my observations with those of Audubon. He states that "by the 12th of that month (August) they had all left Labrador;" whereas, I found them still numerous on the first of September, and I think I never saw so many of both old and young as I did at Henley Harbor on the 30th of August. At what time they really do depart, or whether any remain all winter, I am unable to say. I can account for this and many other discrepancies between our observations with respect to date, only by supposing the season in which Audubon visited the country was a very early one, or that last summer was remarkably delayed.

This species generally chooses for the situation of its nest one of the many small islands, some of them mere rocks jutting out of the water, which everywhere stud the Labrador coast; and contrary to the usual habit of Gulls, it does not congregate in large numbers upon a single island, not more than two or three nests being commonly placed together. It sometimes, however, mixes with the Herring Gulls, for among several hundred of the latter, which circled high over our heads when we invaded their territories, I never failed to detect a few of the Black-backed. I was surprised to find it breeding on some inland ponds, (there also in company with the Herring Gulls,) the nests being placed on small rocks jutting out of the water. In these situations I have thought them less shy than when breeding on islands open to the sea. The nest is large and bulky, composed of moss and lichens scraped into a heap, the cavity apparently formed by the weight of the bird. They are rather shallow for the width, which is nearly or quite two feet externally. The eggs are three, as is usual among the Gulls and Terns, and differ much in size, shape and color, even in those taken from the same nest, some being smaller than the average of Herring Gulls, though they are usually proportionately larger.

On the 4th of July three young birds of this species, apparently but a few days old, were procured and placed in a basket together with a number of Herring Gulls of about the same age. Even thus early they evinced their superiority in size and strength over the other species, for, on looking at them next morning, I found that, their quarters being rather crowded, they had trampled to death every one of the others, and were standing triumphantly over the mass of dead bodies, calling loudly for food. When fed they exhibited the greatest voracity and gluttony, each devouring at a meal three or four capelin some six inches long, which they could swallow whole, and they quarrelled and fought continually for choice morsels. Two of these birds were left in charge of a fisherman at Henley Harbor, and on our return, about seven weeks afterwards, they had grown to fully the size of the adults, and were magnificent birds and great favorites. They kept their plumage perfectly clean and in good order, and were very tame. They were then mottled all over with spots of dusky, most of the primaries, and a subterminal band on the tail, black; bill entirely black, legs and feet light flesh color. This is the plumage in which these Gulls remain the greater part of the first year. One of the birds was much larger and stronger than the other, which it tyrannized over continually and kept in perfect subjection. Both uttered frequently a whining noise, especially when hungry; which state, however, seems to be the normal condition of all Gulls, both young and old.

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The Black-backed Gulls surpass all birds with which I am acquainted in their shyness and wariness, which are so excessive that it is only by stratagem that they can be procured. But two were shot by any of the party, both being killed with guns exceeding in their range those to which the birds were accustomed. They always fly at a great height over the water, and never alight except in open situations which they have previously cautiously examined. Their flight is firm, extremely powerful, performed with measured beats, and is capable of being greatly protracted. They can force their way against the strongest gales. Their food is principally fish of various kinds, though they do not refuse offal of any description. To procure fish they hover at a height of a few yards over the surface, and when one is espied drop heavily upon it, not, however, closing the wings, which are elevated and flapped rapidly to support them. They seldom or never dive, but on such occasions are frequently partially immersed.

During the breeding season the birds are very noisy and clamorous, continually uttering their loud, harsh, rough cries. These are of three distinct kinds; the first, their usual call, is a loud, rough, sonorous "kaw-awk," aptly designated by Audubon as a "furious laugh." They have also a short kind of bark, resembling the syllables "hac-hac-hac;" and in addition to these a loud harsh scream, uttered when their territories are invaded. On the 31st of July I saw a large number of these Gulls collected on the water some ten miles up Esquimaux Bay, where they filled the air with their loud continued cries, which could be distinctly heard at a distance of nearly a mile.

This Gull is universally known to the natives, as well as to sailors and fishermen, as the "Saddle-backed Gull," or, quite as frequently, simply "Saddler." I have never heard applied to it the name of "Coffee-carrier," said to be the title by which it is designated along the coast of New England.

*LARUS ARGENTATUS* Brünn.—Herring Gull. "Blue Gull."

*Larus argentatus*, Aud., Birds Amer. vii. 163, pl. 448. Lawrence, Gen. Rep. 844.

The Herring or Silvery Gull is by far the most abundant of the Gulls along the Labrador coast, where it breeds in great numbers, spending the summer months there, and not retiring at least until the second week in September. They were as abundant as ever on the first of that month, when I noticed great numbers of both old and young. I cannot, therefore, comprehend the statement of Audubon, where, in his account of *Larus marinus*, he says: "No individuals of *Larus argentatus* were, to my knowledge, seen on that coast (Labrador) during the three months that I passed there, and the fishermen told us that the 'Saddle-backs were the only large Gulls that breed there.'" On many of the innumerable small islands which form a belt six or eight miles deep along the coast in the neighborhood of Little Mecattina, and southward, immense companies of these Gulls had assembled to breed; and at Esquimaux Bay I found them breeding on the small ponds of the interior. They are every where known to the natives as "Blue Gulls."

On the 4th of July, at Sloop Harbor, I had an opportunity of visiting many islands where these Gulls were breeding in great numbers. On approaching one of the islands, where the birds were sitting quietly on their nests, or walking leisurely about, when we were still several hundred yards distant, they all left their nests, and with loud discordant screams, indicative of their anger at being disturbed, circled high over our heads far beyond the range of our guns. I found the nests placed on the ground in the most irregular manner, apparently without the slightest choice as to situation, except that they seemed to prefer the moss-covered rocks and dry bare spots, the grassy patches being appropriated by the few Eiders that bred on the same island. And here let me remark, that on those low grassy islands where the Eiders were most numerous, but few Gulls built their nests; and *vice versâ*, on those bare islands where the Gulls had collected in great numbers, we found but few nests of the

Eiders, though the two birds mix to some extent. The nests were large and bulky, composed of dried grass, moss and lichens scraped into a heap, the cavity formed apparently by the weight of the bird. The eggs, in every instance that came under my observation, were three, but varied surprisingly in size, color and markings, and also considerably in shape. They average rather more than two inches and three-quarters in length, by nearly two in greatest diameter, being thus rounded and obtuse. The ground color varies from a light bluish or greenish white to deep brownish olive; and the spots are of every size and shape, very irregularly disposed. I found eggs at that date in every stage of development, some being quite fresh, but in the majority the embryos were nearly fully formed. On the same day many young were procured, being caught as they skulked and hid beneath stones, or scrambled off over the luxuriant moss. In no instance did I observe any on the nests. At this period they presented a very curious appearance; they were ugly and misshapen, covered with thick whitish down, every where mottled with angular spots of dusky, and, on the whole, looked more like lumps of dirty carded wool than any thing else. When taken in hand they bit and scratched with all their strength, at the same time squealing loudly. Although these cries brought the parents a little nearer, none ventured within shot. On being placed on the water they swam with ease, and appeared to be perfectly at home. Soon after being caught they fed freely on fish and scraps of pork, and uttered constantly a whining noise. The first night, however, they were all trampled to death by some Black-backed Gulls placed in the same basket.

At Henley Harbor, during the latter part of August, many birds of the year were seen. They were at this time readily distinguishable from the adults, for besides being smaller, they were entirely of a deep dusky color, darkest below, and with the bills nearly black. One of these, slightly wing-tipped, showed considerable spirit, biting the finger placed incautiously within its reach, and ejecting the contents of its stomach—principally lance—with remarkably accurate and vindictive aim. The lance seems to be the favorite and principal food with this and other Gulls, and many were always to be seen fishing for them at the mouth of the harbor. To procure them they hover at a height of a few yards over the surface and drop suddenly down when a fish is discovered; never, I believe, diving, though they are often partially immersed. They rise again immediately, and the operation is repeated indefinitely, their hunger never seeming to be appeased. I have seen more than a hundred of these Gulls and the great Black-backed and the Ring-billed fishing together, but never noticed the slightest sign of any quarrelling or difficulty between them.

The Herring Gull requires three years to arrive at full maturity. During the greater part of the first year they are much as described above. The dusky gradually grows lighter, and by the second year the bird is white, mottled with dusky about the head and neck; the tail mostly black, the primaries black, as yet without spots, and the "gull-blue" replacing the grey mottling of the wings and back in irregular patches; the bill light flesh color, with a broad black band near the end. By the next winter the bird is perfect, except some slight mottling about the head and neck, and the following spring is in full plumage. I am enabled to give the above descriptions from specimens sent me from near Hampton, N. H., by Mr. Charles Perkins, shot about the first of December. They must moult very late, as some of these specimens had the quills only partially grown out. I am unable to say whether any breed in the immature plumage.

The abundance of this gull every where during its extensive migrations, cause its voice, flight and general manners to be so well known, that a detailed account of them is rendered unnecessary.

LARUS DELAWARENSIS Ord.—Ring-billed Gull.

*Larus zonorhynchus*, Aud., Birds Amer. vii. 152; pl. 446.

*Larus Delawarensis*, Lawrence, Gen. Rep. 846.

Three specimens of this small Gull were obtained at Henley Harbor on the

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21st of August. They were all birds of the year, being every where mottled with dull greyish; the primaries and a broad terminal band on the tail black, as is also the terminal third of the bill, the rest being light flesh color. They were shot while busily engaged in fishing for lance, which seemed to form their favorite food. On skinning them, I found the gullet and stomach filled with the fish. They were not at all shy; they permitted a near approach without desisting from their occupation, and the three were shot in rapid succession before the rest became alarmed and flew off. Indeed, I have often thought that the wariness of Gulls is in exact proportion to their size. Thus the little Hooded Gulls, and the Kittiwakes, are so familiar as to bover and sport near the stern of a vessel; the Ring-bills come next, and though not so unsuspecting as the last, are by no means shy; the Herring Gulls, the next in size, are much more watchful and difficult to procure, while the Black-backed and Glaucous Gulls evince such excessive wariness and caution that it is only by stratagem they can be procured. Though the theory may not hold good in all cases, I certainly saw no exceptions to it during my stay in Labrador.

CHROICOCEPHALUS PHILADELPHIA (Ord.) Lawr.—Bonaparte's Gull.

*Larus Bonapartei*, Aud., Birds Amer. vii. 131; pl. 442.

*Chroicocephalus Philadelphia*, Lawrence, Gen. Rep. 852.

Many of these beautiful little Gulls were seen at different times during the voyage, though they were perhaps more abundant than elsewhere in the southern portions of the Gulf of St. Lawrence. It is not a little singular that the breeding places of a Gull so common, well known, and widely diffused as the present, should be still unascertained with certainty, and the egg almost unknown to science; yet such is the case. Though my opportunities of observing this species were limited, I could not but be struck with the remarkable familiarity and want of suspicion exhibited by it on all occasions. Numbers would often hover and sport around the stern of the vessel, so close that I could plainly see the dark spot behind the eye which characterizes the immature bird of this species. Their flight on such occasions, and indeed at all times, is extremely buoyant and graceful, in these respects resembling that of a Tern rather than of a Gull. I noticed that, while flying, individuals would scratch the head and neck with their claws, which operation, however, did not seem to impede their flight in the least. At that season (September) none were seen with the head enveloped in the hood which adorns both sexes during the breeding season. Those which I took to be birds of the year, had all a broad subterminal band of black on the tail, and in many the black of the primaries extended unbroken over the shoulder quite to the body.

RISSA TRYDACTILA (L.) Bon.—Kittiwake Gull.

*Larus tridactylus*, Aud., Birds Amer. vii. 146; pl. 444.

*Rissa tridactyla*, Lawrence, Gen. Rep. 854.

I met with this interesting Gull on but one occasion, which was on the 3d of August, while sailing up Esquimaux Bay several miles from its mouth. A small company hovered and circled over the boat, and a specimen was secured. Being only wing-tipped, it fluttered to some distance on the water, constantly uttering its piercing screams, which caused its comrades to hover over it for some time, showing their sympathy by loud cries.

STERNA WILSONI Bon.—Wilson's Tern. "Mackerel Gull."

*Sterna Wilsoni*, Aud., Birds Amer. vii. 97; pl. 433. Lawrence, Gen. Rep. 861.

During my short stay at Rigolet, I saw a good many of these Terns, but found none in any other locality. They possess in the extreme the buoyancy, gracefulness and ease of flight for which the whole family is so celebrated, performing the most beautiful evolutions without the least apparent effort. To obtain  
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their food, which, as far as I could ascertain, consisted chiefly of small fish, they hover lightly and slowly over the water at a height of a few feet. When a fish is espied, they nearly or quite close the wings and dart down with great rapidity, and usually go quite under water. With a slight shiver the beautiful birds shake the water off their plumage, swallow the fish as they reascend, and again hover eagerly watching for more. They were not at all shy. They are known to the natives by quite a variety of names. I have heard them called "Rapes," "Steerines," "Pathricks," and "Mackerel Gulls," the last being the name by which they and other Terns are known to the fishermen, given in reference to their forked tail.

COLYMBUS TORQUATUS Brunn.—Great Northern Diver. "Loon," "Loo."

*Colymbus glacialis*, Aud., Birds Amer. vii. 282; pl. 476.

*Colymbus torquatus*, Lawrence, Gen. Rep. 888.

This large, powerful and hardy bird is abundant throughout Labrador. It frequents chiefly the numerous ponds formed by the depressions of the rugged surface of the country, near the borders of which the nest is usually placed. Though numbers were seen, yet so shy, wary and vigilant is it, and so expert in eluding pursuit on the water by its extraordinary powers of diving, that not a single one was obtained by any of the party. The most successful method of procuring it is to lie perfectly concealed near the edge of the pond where it may be swimming, and to decoy it within shot by imitating its notes. The imitation, however, must be skilfully executed, or the wary bird will perceive the deception. The notes of the Loon, of all the birds with which I am acquainted, are the most wild, free and independent, seemingly uttered in full knowledge of the security which its wariness and vigor afford. It is from its cry that it derives its name of "Loon," or "Loo," as it is perhaps oftener pronounced by the natives. On the first of August, I came upon a pair of these birds on an inland pond, about three long gunshots wide; they had with them two young birds, apparently but a few days old. Perfectly aware of the safety of their position, they remained close together exactly in the centre of the pond, keeping the young between them, and at intervals sending forth their loud defiant screams. On being fired at, they simply ducked for a moment beneath the surface, and immediately rose again, and I was obliged to leave them to their occupations.

? COLYMBUS SEPTENTRIONALIS Linn.—Red-throated Diver.

*Colymbus septentrionalis*, Aud., Birds Amer. vii. 299; pl. 478. Lawrence, Gen. Rep. 890.

I obtained two eggs, supposed to be of this species, at Sloop Harbor, on the 4th of July; they were at that date quite fresh. The parent was seen but at a distance too great for positive identification. The nest was placed on the edge of a small pool of water, on a small barren island, and was very rudely constructed of dried rushes matted loosely together, on which the eggs were deposited without the slightest attempt at concealment. They measured two inches and nine-sixteenths in length, by one and eleven-sixteenths in breadth, and were of a uniform dark olive brown, with rather small spots of a very dark brownish black, and a few others of a lighter tint. They were much shorter and more rounded than undoubted eggs of *C. septentrionalis*, their form being regularly ovate, while that of the latter is nearly elliptical. The color was lighter. Very possibly they belonged to *C. Arcticus*.

ALCA IMPENNIS Linnæus.—Great Auk. "Penguin."

*Alca impennis*, Aud., Birds Amer. vii.; pl. 465. Cassin, Gen. Rep. 900.

Concerning this most extraordinary bird, remarkable in consequence of its not possessing the power of flight, and as being the sole representative in the

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northern hemisphere of the numerous Penguins, (*Aptenodytes*) of the southern, I made diligent inquiry of every one who might be expected to have any knowledge of it. I was the more anxious to obtain some account of it from the fact of its being supposed to be nearly if not quite extinct; its introduction into the fauna of North America resting on very insufficient data. Though none of the natives of Labrador whom I interrogated had any knowledge of it, the fishermen knew immediately to what I referred when I spoke of "Penguins"—as they are called—and all with singular unanimity agreed in designating the Funks, an island off the south-east coast of Newfoundland as the only place where the birds were to be found. Yet I could never find a person who had actually *seen* one of the birds; they had only heard of them as Penguins. But the fact of their all agreeing as to the precise locality where the birds were to be found, seemed to me worthy of attention.

#### UTAMANIA Leach.

*Gen. Ch.*—Size moderate. General form stout, heavy, strong, compact; head moderate, neck short and thick, body heavy. Wings moderate; tail short; feet short and strong. Bill lengthened, about equal to the head, densely feathered for half its length, the feathers on the upper mandible extending much beyond the middle of the commissure, and nearly as far as those on the lower; very strong, much compressed, with several transverse grooves which are curved in the upper mandible. Upper mandible much deeper than the lower, with a moderately prominent basal ridge at base of the horny portion; the culmen regularly arched, tip considerably hooked and bent over the lower. Commissure very long, quite straight to near the tip where it is suddenly decurved. Gouys about straight. Nostrils linear, not pervious, moderately long, very narrow, situated just above the commissure on the feathered portion of the bill, immediately posterior to the lower corner of the basal ridge. Wings fully developed, admitting of flight, reaching beyond the base of the tail; primaries stiff, strong, somewhat fulcate, first longest. Tail short, pointed, rather stiffened, the feathers acuminate, central pair tapering and elongated. Legs short, stout and strong; tibia bare for a short space above the joint; tarsus shorter than the middle toe. Toes three, anterior, entirely united by a membrane. Claws all short, stout, blunt.

*Colors.*—Neck and upper parts brownish black; beneath white. A conspicuous white line from the eye to the summit of the basal ridge.

The essential characters of this genus lie in the wings, which are fully developed and admit of flight. By this alone it would be entitled to full generic rank, distinct from *Alca* with the type *A. impennis* L., were there no other characters involved. But one species, the *U. torda* Leach, is known, which is found abundantly in the more northern portions of both hemispheres, and is the most characteristic bird of those regions.

#### UTAMANIA TORDA Leach.—Razor-billed Auk. "Tinker."

*Alca torda*, Aud., Birds Amer. vii. 247; pl. 466.

*Alca (Utamania) torda*, Cassin, Gen. Rep. 901.

This, the most characteristic bird of marine arctic fauna, is remarkably abundant throughout the extent of Labrador. While in the Gulf of St. Lawrence, before reaching that country, numbers were every day seen flying rather low over the water, generally in single file, and sometimes passing very close around the vessel. At Esquimaux Bay, the most northern point visited, they were perhaps more numerous than elsewhere, breeding plentifully among the many thousands of Puffins there collected. I was credibly informed that they formerly bred in so great numbers on Backelew Island, off the coast of Newfoundland, that they received the name of "Backelew Birds;" an appellation I occasionally still heard applied to them, though they have entirely deserted the  
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island. Another small island on the east side of Esquimaux Bay, has in a like manner been deserted, the birds apparently having retired to the Puffin islands on the opposite side of the Bay. From these facts, I could not but conclude that the birds are slowly but surely retiring before the persecutions of man to more northern and inaccessible regions, though thousands still breed as far and farther south than Little Mecattina and the Murre Rocks.

It was at Sloop Harbor, on the third of July, that I first formed acquaintance with the Razor-billed Auks. As we dropped anchor in that sheltered cove, a large company of them were sitting at a little distance on a flat rock, crowded closely together, and all facing towards the sun, then low in the skies. They rested perfectly upright on their rumps, occasionally twisting their bodies in a curious jerking manner. No sooner, however, had our boat touched the rocky shore than they all instantly took flight and dispersed either singly or in small flocks. Although so watchful, they seemed to be not at all aware of the nature of the danger that threatened them, for they flew directly towards or past us as often as in any other direction, and numbers were easily shot. On the following day, the fourth of July, while searching for the eggs of the Eiders and Herring Gulls, I had abundant opportunity for observing their flight and general manners, for they bred in considerable numbers in the crevices of all the rocky islands in the vicinity.

Although the Razor-bills cannot be approached while sitting on the rocks, yet while flying they evince such a want of caution, or rather so much stupidity, as to fly continually directly over and past a boat at such short distances that they are easily shot down. But they are strong and tough birds and carry a great deal of shot, requiring a heavy charge to kill them. I have occasionally seen one fly off, apparently as strong as ever, leaving a cloud of white feathers floating in the air. When only one wing is broken they dive with great ease and celerity, and are then difficult to secure. When shot at and not touched, they open and shut the tail, swerve from their course and quicken their flight.

Though they are, I believe, entirely mute while flying, on being wounded and taken in hand they utter a loud, rough, hoarse cry, at the same time throwing themselves on their backs, fighting and scratching most furiously. They bite with great force, their strong hooked bills enabling them to inflict a severe wound, and they will suffer themselves to be held up by their bite before they will relax their hold. The name of *Razor-bill* is certainly a most appropriate one.

The flight of this bird is firm, well-sustained, very swift, and, considering the heavy body and short wings, very powerful. It is performed with short, quick, vigorous flappings. They never sail; but on one occasion I saw an individual endeavor to flap its wings with a slow, measured stroke. It was but a few yards, however, and it at once found that mode of flight impracticable. On the water they swim lightly and elegantly with the head and tail elevated, exactly as represented in the right hand figure of Audubon's life-like plate. When well stewed, their flesh is by no means poor, being, though rather tough, well flavored, and not possessing the slightest rank or fishy taste. We all ate them whenever they could be procured.

The situations chosen by the Auks for their breeding places are generally the rocky, precipitous islands where there are many caverns and fissures, in which the eggs are deposited, often together with those of the Black Guillemot, *Uria grylle*. I have never found more than a single egg, though in the face of such authority as Audubon to the contrary, I should not like to assert that two are never laid. I have great pleasure in being able to corroborate the statement made by this distinguished ornithologist with regard to the sagacity displayed by the birds in protecting their eggs from the wet. When deposited in damp fissures, through which the water is continually percolating, a layer of small pebbles is placed beneath the egg, to keep it from the moisture, but in sufficiently dry situations, where the caution is no longer necessary, the birds never undertake the additional labor.

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The eggs, though differing considerably in their markings, are comparatively uniform in size and shape, being usually about three inches in length by a very little less than two in breadth. The ground color is either pure white or with a creamy or light bluish tinge. The spots are of different shades of umber brown, very often attracted into a ring around the larger end, but sometimes pretty uniformly distributed. They vary in size from mere points to large blotches. The eggs, though thus differing among themselves, still always preserve a certain character distinct from that of the Murre, through all the endless variations of the latter. They are smaller, their shape is less elongated, they are never of a green ground color, and are never fantastically streaked and lined—the more usual pattern among those of the Murre.

I was not a little surprised, when I visited the Puffin Islands, to find there the Auks also, breeding in considerable numbers. I estimated that a fourth or fifth part of the many thousand birds breeding there were of this species. On the north side the island is rocky and precipitous, and there the birds principally collected; yet on all other sides they were mixing indiscriminately with the Puffins, and laying their single egg in the deserted holes of the latter. In these holes, where the earth was comparatively dry and warm, not a vestige of a nest of any kind was found, the egg being deposited on the bare ground. Associated so intimately, I never saw the slightest semblance of any difficulty between the two species, although in some instances they were incubating in contiguous holes. At that date (July 25th) some of the eggs were quite fresh, and I found young birds, from which is to be inferred that the species is not very exact as to the time of laying its eggs.

I noticed another fact that I do not recollect of having seen recorded; it is, that the Auks associate in considerable numbers with the Murres. While passing the well-known rocks where the latter were breeding in tens of thousands, among the countless flocks flying constantly around us, we never failed to detect some of the Auks, either in flocks by themselves or mixing indiscriminately with the Murres. Although the two birds are identical in size and colors, they could always be distinguished, even at the distance of a long gun shot, by their bills; the long, slender and pointed ones of the Murres contrasting distinctly with the short, thick, seemingly truncate bills of the Auks. As a natural consequence of this intermingling, the eggs must of necessity be confounded; yet I do not think it would be difficult to distinguish with tolerable certainty the two kinds, by the differences already pointed out.

It would seem the Razor-billed Auk is capable of conforming its habits in a remarkable degree to suit varying circumstances, while carrying out the great law of reproduction. Its eggs are deposited in fissures and caverns with the Black Guillemot, on the bare rock with the Murre, and in holes in the ground with the Puffin. The time of depositing its eggs, and their number, (?) also vary. The fact of its associating in perfect harmony with other species to the extent which it does, indicates the possession of a remarkably peaceful disposition. It is known universally to all fishermen and eggers, as well as to the natives, by the singular name of "*Tinker*." Its proper name I never heard applied to it.

MORMON ARCTICUS ?\* Illiger.—Arctic Puffin. "*Parrakeet*."

*Mormon arcticus*, Aud., Birds Amer. vii, 238, pl. 464. Cassin, Gen. Rep. 903.

The habit of collecting in immense numbers at particular localities during

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\* A series of Puffins recently received from Europe by the Smithsonian Institution, has raised a doubt with regard to the specific identity of the American bird with the true *M. arcticus* of Europe. I have therefore thought it proper to give the name *arcticus* with a query. It is also believed that there is on the Labrador coast an undescribed species of *Mormon*, in addition to the present. Prof. Baird is at present investigating the subject, the results of which will soon be published in a monograph.

the breeding season, so characteristic of the whole family of *Alcidæ*, is a trait exhibited in the highest degree by the species now under consideration. With scarcely the exception of the Common Murre, no bird of the family shows so pre-eminently gregarious a disposition as does the Arctic Puffin. Collecting, as it does in thousands, on particular islands of small extent, it becomes a matter of astonishment that food can be procured in sufficient quantity to sustain them, or that each pair can find a place to deposit its egg. The pertinacity, too, with which they cling to the immediate vicinity of their breeding place is remarkable. But a very short distance from an island where there are thousands, it is a comparatively uncommon thing to see a Puffin. The most extensive of these breeding places appears to be an island near the harbor of Bras-D'or, visited by Audubon in 1833, of which he has written so graphic and instructive an account. The one, however, that I had an opportunity of visiting cannot be much behind it in point of the numbers of the birds breeding on it; and during a stay of three days I had ample opportunity of examining the island and noting the manners of its curious population. My visit was on the 25th, 26th and 27th of July. Let a short extract from my journal describe our approach to the island.

"We were now within less than a mile from the island, towards which all eyes were anxiously turned, and still not a bird met our gaze. But a few minutes more, however, and they commenced to appear, flying round the boat or resting on the water; all were 'Parrakeets' and 'Tinkers,' except now and then a solitary 'Turre.' They were tamer than I ever saw birds before, almost flying between the masts of our little whale-boat; it was hard to restrain from firing. As we rounded the island close to the shore, they came tumbling out of their holes by hundreds, and with the thousands we disturbed from the surface of the water, soon made a perfect cloud above and around us, no longer flying in flocks, but forming one dense continuous mass. And yet not a gun had been fired."

The Parrakeet Islands are three in number, lying along the western shore of Esquimaux Bay, just at its mouth. The one I visited is the innermost as well as the largest, though the others are equally crammed with the birds. It is about a mile in circumference; in shape almost a perfect semicircle, with two points stretching out and enclosing a snug cove, where only can a landing be effected with safety. It is abrupt and precipitous on the three sides, the fourth sloping gradually down to the cove. The top is nearly flat, and covered with a rather luxuriant growth of grass, the soil being enriched by the innumerable droppings of the birds. The three sides in which the holes are dug are so steep and precipitous that it required considerable agility to scramble along them, the danger of falling into the water below being increased by the slipperiness of the soil, worn smooth by innumerable feet, and continually moistened with ordure. The sides are composed of soft loamy earth, with rocks of every size and shape jutting out in all directions, and afford the most favorable possible conditions for the excavation of the burrows. The fourth side between the two points is composed mostly of masses of rock, in the crevices of which the Auks chiefly deposit their eggs, though they very often appropriate the deserted holes of the Puffins.

The holes in the ground in which the Puffins deposit their eggs,—a habit, as far as I am aware, entirely peculiar to the genus in this family of birds—are excavated by the birds themselves, an operation for which their powerful beaks and long strong and sharp claws admirably adapt them. They extend nearly or quite in a horizontal direction, and are subcircular in shape, with the diameter scarcely larger than is necessary for the free passage of a single bird. They vary much in length, but the majority are not so deep but that the egg may be reached by thrusting in the arm to its fullest extent. Their course is seldom in a straight direction; they curve and wind in a most tortuous manner, many burrows being connected together by winding passages. The en-

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trances to the holes are worn flat and smooth by continual paddling from the feet of the birds, and, as well as the whole sides of the island, are moist and slippery with the ordure. The sides of the island from just above high water mark to the very top, are perforated with innumerable holes, but on the top itself not a single burrow is to be seen. At the further extremity of the hole, which is usually a little enlarged, the single egg is deposited, always a slight bed of dried grasses being first arranged to keep it from the moist earth. I have indeed found eggs lying on the bare ground near the entrance of the burrows, whither they had apparently been dragged by the bird as it hurriedly made its exit; but in no instance did I find one in its usual position at the further extremity, that was not upon a layer of grass. I noticed this fact the more particularly, since Audubon expressly states that no nest whatever is formed for the reception of the egg. Without for a moment doubting the accuracy of that great naturalist's observations, the present case is only additional proof of the extent to which the habits of birds are influenced by circumstances; the position of nests, the number of eggs, &c., varying much, and the food changing in a measure with every change of locality. The eggs measure two and a half inches in length, by one and three-fourths in greatest diameter, varying very little from this standard; in shape, which is a rather rounded ovate, they differ in being more or less obtuse at the smaller end. The greatest diameter is nearly opposite the middle. The shell is usually more or less granulated, but differs much in the extent of the granulation. The color is white or whitish, varying from nearly pure to a brownish hue, the latter color being in the shell, and not caused by soiling or discoloration. They are marked with obsolete, sometimes almost imperceptible dots, spots, and lines of light purplish, mostly attracted into a ring around the large end. There are sometimes a few irregular splashes of very light yellowish brown. Audubon is clearly in error when he states that they are simply "pure white." At that date, (July 25th) they all with few exceptions contained young about to be hatched.

Another extract from my journal will portray, perhaps more graphically than could be done in any other style, the manners of the birds on being invaded. "Hardly had our boat touched the shore than we leaped out, guns in hand, and at once scattered over the island. As we advanced along the sides, the affrighted birds darted past us like arrows, issuing from their burrows beneath our feet and around us, and all making directly for the water. Those already disturbed flew in every direction above us, while thousands rested on the water in a dense mass at a little distance. I took my stand on a flat rock, and in less than an hour a pile of Puffins, more than I could carry, lay at my feet. Shortly after I commenced firing the birds formed themselves into an immense circle, of a diameter of perhaps a third of a mile, one point of which just grazed the island. It was astonishing to see with what precision this circle was preserved, each bird flying directly in the wake of the one that preceded. I had merely to stand facing the advancing birds, and no better opportunity for continual slaughter could be desired. I now realized what I had been told, but had found hard to believe, that a wagon might be filled with the birds by a tolerably expert marksman, shooting them at just such a moment that they should fall into it. The poor things seemed not at all aware of the nature of the danger that threatened them; flying so close past me that I could almost strike them with my gun. During the continual firing the birds would emerge from their holes every minute or two; and after shooting for half an hour on one spot I was not a little surprised to see two or three start out almost from between my feet, and in great fright make the best of their way down to the water. On emerging from the holes the birds generally looked around for a moment to see what was the matter, and then in great haste fluttered and tumbled down to the water below, in which they immediately dived, and swimming swiftly under water reappeared at some distance. From the countless thousands flying  
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around me I did not hear the slightest note of any kind; they flew in perfect silence. When wounded, if they fell on the land, they immediately ran and threw themselves into the nearest hole, if in the water, they dived and swam as far under the surface as their strength allowed. I observed not the slightest indication of any sympathy for those wounded or killed on the part of the other birds, as stated by Audubon. The survivors did not notice them in the least, though they lay exposed everywhere on the rocks, and floated about on the water."

The flight of the Puffin when once on wing is firm, well sustained, very swift and performed with short, quick, vigorous beats. When it takes flight from a rock whence it can project itself into the air, it at once supports itself without difficulty; but when on the water it is obliged to flap over the surface for several yards before it can rise on wing. When getting under weigh, the feet are extended backwards, and outwards on each side of the tail, which is spread, but they are soon drawn up, and the tail closed. When shot at and not touched, like the Auks they swerve from their course, open and shut the tail, and extend the feet. When standing on a rock or at the entrance of their burrows, where they alight without the slightest difficulty, they present a peculiarly grotesque appearance, such as is afforded by no other bird. Their short thickset bodies, big heads, enormous brightly colored bills and red legs, give them a comical appearance, which is enhanced by their upright position and the odd nature of their movements, as they twist the head and jerk the body in various directions. Though on a three days acquaintance we were somewhat familiarized with their movements, we could never quite restrain a laugh when we saw one thus "attitudinizing" on the edge of a rock.

When taken in hand the Puffin utters a loud, hoarse, croaking scream, at the same time fighting most furiously. They are capable of inflicting a very severe wound with their powerful bills, easily drawing the blood. Their long and strong inner claw is also an effective weapon, so that by dint of scratching, biting, and struggling, they proved difficult customers to manage. The most courageous of our party seldom held one more than a few moments before he was glad to set it at liberty. Indeed, their rage at being caught is so ungovernable, that two held together attacked each other with fury, and a single one held up by the wings, bit its own wing and scratched its own face most energetically.

I could not but admire the beautiful provision of nature with regard to furnishing this bird with the means of excavating its burrow with facility. The inner claw of each foot is very long, much curved and excessively sharp. To preserve it so, when not in use, it always lies perfectly flat, so that the point does not rest on the ground. In digging and fighting, however, it is held upright, and then becomes a very effective weapon. The bill, always so remarkable in form and color, varies much with age in size and shape, and also in the extent of the ridges and furrows. The color, however, is always pretty constant; and a description of its tints, with those of the eyes, feet, &c., taken from a very perfect fresh bird, may not be uninteresting, as the color fades much in dried specimens. Base of the bill and first ridge dull yellowish white, between the two dark bluish ash; rest of bill bright vermilion red, the tip of the lower mandible and the two last furrows being yellowish white. Inside of mouth and warty rugose excrescences at the base of the commissure bright chrome. Iris hazel, eyelids vermilion, the short processes above and below the eye bluish ash. Legs and feet bright orange red, claws black.

I was much surprised while at Rigolet, to see a great number of Puffins flying over the surface of the Bay in large compact flocks. Whether they had come from the island described, or whether there was another island in the immediate vicinity, I am unable to say, though I think the latter most probably the case. These birds proved rather shy, avoiding our boats with some care. The fact of their being found so far inland is worth recording.

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The flesh of the Puffin, though not ill-flavored, is so excessively tough as to be eatable only in cases of necessity. It is most commonly known as the "Parrakeet," (Paroquet) as it is pronounced; they are also called "Sea-parrots," and are sometimes designated by their proper name of Puffin.

URIA (URIA) GRYLLE Latham.—Black Guillemot.—"Sea-pigeon."

*Uria grylle*, Aud., Birds Amer. vii. 272, pl. 474.

*Uria (Uria) grylle*, Cassin, Gen. Rep. 911.

The history of the Black Guillemot is an interesting one. In the extraordinary changes of plumage it undergoes, in its extensive breeding range, and the many entirely peculiar habits it possesses, it differs widely from all birds of the family on the eastern coast of America. The most remarkable fact connected with it is, that it breeds abundantly in the interior of the continent, being found in great numbers on the southern shores of Hudson's Bay, while the other species of *Alcidæ* are probably without an exception exclusively marine. It is very plentiful throughout the extent of Labrador, where many remain during the whole winter; in fact, with the exception of the Auks, Murres, and Puffins, which congregate in such immense numbers at certain places, it is the most common and generally distributed bird, breeding along the whole coast. I obtained eggs at Sloop Harbor, the first locality visited, and at Groswater Bay they were still more abundant. Audubon speaks of finding them at the Magdaline Islands, and I have seen specimens from Greenland, which, with the fact of its breeding plentifully on Hudson's Bay, prove for it a breeding range remarkable among the *Alcidæ*. It is a hardy bird, remaining throughout the year in Labrador. The changes of plumage which it undergoes are very great. About the middle of August, or as soon as the duties of rearing the young are concluded, the change commences, with the moult. In a very short time they have become most curiously mottled with pure white, and the change goes on till the body becomes almost entirely white—the wings and tail mostly remaining black. In this state of plumage, which is shared also by the young for the first year, they continue during the winter, and until the breeding dress is again assumed the following spring. While undergoing the change, they are entirely unable to fly, from the loss of the primary quills.

The Black Guillemot chooses for its breeding place the most rocky, broken, and precipitous islands along the coast, in the numerous fissures and caverns of the eggs are deposited. Wherever there are rough jagged rocks sloping down in huge masses to the water, there the Black Guillemot will always be found breeding in greater or less abundance. Though they never congregate at one spot in such immense numbers as the Puffins and Murres are wont to do, yet there are some islands which, from their peculiar adaptation to their wants, are taken complete possession of by the birds. These islands, wherever found, are known to the natives as "Sea-pigeon Islands." Here they breed in great numbers, every fissure and cavern being occupied by one or more pair. They show marked preference for the most tortuous and deepest crevices, at the extremity of which the eggs are deposited. They are most usually two in number; never more, so far as my own observations extend; but as Audubon, on the best of authority, personal observation, expressly states that the number is sometimes three, the fact must be considered as established. They measure nearly or quite two inches and three-eighths in length by one and five-eighths in greatest diameter, and are, in size and shape—which latter is nearly elliptical—pretty constant, much more so than is usual in the family. The shell is rough; its ground color a very light greenish or earthy white; it is irregularly spotted and blotched with two shades of brown, one very dark, and with light purplish. The markings are mostly attracted into a ring about the larger end, though they vary much in their disposition, sometimes being very regularly distributed over the whole surface. The egg is never, I

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believe, streaked in any manner. Towards the latter part of June or 1st of July the eggs are laid, and the young appear the second or third week of that month; but the precise period of incubation I am unable to state. When surprised on the nest, the parent, if she be not already there, creeps to the furthest extremity of the fissure, and, as if aware of the safety of her retreat, cannot be induced to come out. But if it becomes aware of an approach before the entrance be obstructed, it invariably takes flight, making directly for the water. Should the fissure be so shallow that the bird may be reached by the hand, it sits quite still, even allowing a noose to be put over its head without struggling, and on being taken in hand shows a gentleness of disposition quite the opposite of the Puffins. It merely pecks at the hand once or twice feebly, and yields itself in silence and without struggling. The young at first are entirely of a dull sooty black, and have not the beautiful vermilion legs of the adult, these being of a dusky hue. They constantly utter a low, plaintive "peep," when requiring attention from the parent. On a warm, sunny day, all the birds will sometimes leave their eggs and young, and collect in large flocks on the water at a little distance from the shore, where they wash and plume themselves. So completely are the nests deserted on these occasions, that on an island nearly a mile in circumference, I have found but a single bird on its nest, though hundreds rested on the water at a little distance.

The flight of the Black Guillemot is firm, even, and direct, though not powerful; performed by quick flappings, when the white of the upper and under surfaces of the wings shows as one continuous spot. They invariably, except when going to and from their eggs, fly very low over the water; I never saw one more than a few feet over the surface, and they usually just clear the tops of the waves. They are rather timid and wary, seldom allowing an open approach within shooting distance, and always when flying, wheeling and changing their direction just at the right moment. The best way to procure them is to sail or row directly down wind upon them, since, being unable to rise from the water except against the wind, they are forced to fly in such a direction as to afford a good shot. They often dive on being approached, when by noting their direction and pursuing in haste, they may be shot the instant they rise, or as they fly off. They are most expert divers, easily eluding, when on the watch, the shot intended for their destruction. When shot at in flight and not touched, they generally plunge at once into the water, as if killed, which idea however is quickly dispelled by seeing them reappear at a little distance and take flight. Except near large breeding places they are seldom seen in companies of more than a dozen, and far oftener they are to be found singly, or two or three together. They are universally known to the natives and fishermen as "Sca-pigeons," the only name I ever heard applied to them.

URIA (CATARACTES) LOMVIA, Brünn.—Foolish Guillemot. Murre. "Turre."

*Uria (Cataractes) lomvia*, Cassin, Gen. Rep. 913.

On the sixth of July we passed a celebrated breeding place of these birds, known as the "Murre Rocks," situated a few miles north of the harbor of Little Mecatina. They are two small, rocky and very precipitous islands, almost entirely destitute of vegetation; the sides, which rise abruptly from the sea, are composed of successive tiers or ledges of shelving rock, on which the eggs are deposited. The birds at this date were breeding on the islands by tens of thousands; their number was truly incredible, and yet I was informed that these were rather fewer than usual. As we drew near the island, the air seemed darkened with the masses that wheeled and circled overhead; while on every flat rock and ledge the birds were densely packed in rows and tiers, each sitting, or rather standing (for they seemed to rest perfectly upright on their rumps) sentinel over its solitary egg. The birds all seemed to be facing in the same direction, and it was with great pleasure that I noticed the curious

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effect mentioned by Audubon in his interesting account. The white breasts of the birds appeared in marked contrast to the dull grey of the rocks, with which the color of the head and neck so well harmonized as to cause the birds to appear deprived of those very indispensable portions. To my great disappointment, I was not permitted to land and examine the islands and their inhabitants; our captain, as on other occasions, paying no regard to the wishes of the passengers. Again, on our return, though we passed between the islands, not for an hour, even, would he delay, to enable me to notice the birds or to obtain specimens. I am therefore unable to give any account of the manners of these most interesting birds. A barrel of eggs was procured, and placed at my disposal.

The egg of the Foolish Guillemot is notorious among that of all other birds, for the variations it presents in size, shape, color and markings, but more especially the latter. From a large number of specimens, I found the average size to be a very little over three inches and one-fourth in length, by two in greatest diameter, while the greatest difference in length was five-eighths of an inch. The diameter was much more constant, differing but one-fourth, thus causing the variations in shape to be exceedingly great. The ground color of the egg varies from a bright cream color to pure white, and then passing through earthy, greyish, bluish and greenish-white to light green, is found of every shade of the green to the very darkest. The more usual color is some shade of green. The markings of the cream colored and white specimens are usually spots and blotches of different shades of brown, pretty uniformly disposed over the whole surface. Eggs of this type bear the closest resemblance to those of *Utamania torda*, but may usually be easily distinguished by their larger size and more pyriform shape. The prevailing pattern of coloration among the light earthy and bluish-white eggs is a ring of spots around the larger end; these very closely resemble those of *Uria grylle*, as far as color is concerned. The green eggs present an infinite variety of patterns, which it would be useless to attempt to define; they are oftener streaked than blotched, the lines being angular and sharply defined, crossed and recrossed in the most fantastic manner. Occasionally a pure white egg is met with, and I have seen some that had much the peculiar pattern and appearance of those of *Meleagris gallinavo*.

The "egging," or traffic in the eggs of the Murre as at present carried on, is on systematic principles, and furnishes constant employment during the summer to men who make it their profession. The method pursued to procure the eggs fresh is singularly unique, but entirely successful. They land on one of the islands and break every egg that they can find upon it; the next day, repairing to the spot, all those eggs found cannot but be fresh. By collecting these, of course the birds are prevented from sitting, and thus any quantity of eggs may be procured. Notwithstanding the wholesale system of destruction thus carried on against the birds, they are still to be found in prodigious multitudes; yet it is remarked by all those who have visited the coast for a number of years, that their numbers are slowly but surely decreasing under this incessant persecution, which not even their myriads enable them to withstand. I was informed that there is a law which forbids the collecting of the eggs, but if so, it has very little practical effect.

The present species, as well as the *U. ringvia* and *U. arra*, is known to the natives and fishermen as either the "Murre" or "Turre," the latter being perhaps the more usual appellation. This name is also applied to the *Mergulus alle*, which is known as the "Little Turre," or sometimes as the "Little Noddie." On the coast of Maine it is also called "Ice-bird."

A letter was read from Dr. Jas. C. Fisher, resigning his office as Librarian of the Academy.

On motion the resignation was accepted.

*September 3d.*

Dr. LEIDY in the Chair.

Eleven members present.

The following papers were presented for publication :

“On the genus *Podotheucus*, by Theodore Gill.”

“Description of a new generic type of *Blennoids*, by Theodore Gill.”

“Monograph of the *Tridigitate Uranoseopoids*, by Theodore Gill.”

“Synopsis of the *Polynematoids*, by Theodore Gill.”

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*September 10th.*

Dr. LEIDY in the Chair.

Twenty-one members present.

The following papers were presented for publication :

“Rectification of the paper upon *Hemiptera* of the North Pacific Exploring Expedition, by P. R. Uhler.”

“*Homoptera* of the North Pacific Exploring Expedition, under Commanders Rodgers and Ringgold, by P. R. Uhler.”

“Descriptions of four new species of *Hemiptera*, collected by the North Western Boundary Survey, by P. R. Uhler.”

“Nine new species of North American *Limnobiadæ*, by R. Osten Sacken.”

“Contributions to the *Ophiology* of Lower California, Mexico and Central America, by E. D. Cope.”

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*September 17th.*

Vice-President BRIDGES in the Chair.

Eighteen members present.

A paper was presented for publication entitled, “List of the *Mollusca* inhabiting the neighborhood of Philadelphia, by Wm. M. Gabb.”

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*September 24th.*

Vice-President BRIDGES in the Chair.

Twenty-seven members present.

On report of the respective Committees, the following papers were ordered to be published in the Proceedings.

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On the genus *PODOTHUCUS*.

BY THEODORE GILL.

In the Proceedings of the Academy of Natural Sciences for April, 1861, a very characteristic type of the family of *Agonoids*, recently discovered by Dr. Kennerly, the Naturalist of the North-western Boundary Survey, has been noticed. The following full and detailed description of the species is now submitted. The analytical table of the family will exhibit the relations of the genus to the other members of that group.

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- Dorsal fins two.  
 Body compressed and elevated towards the front.  
 Head continuous with back, parallelopiped and compressed like *Trigla*,  
 Dorsal fins separated; first remote from nape,  
 Head separated from back by a deep nuchal depression,  
 Dorsal fins separated,  
 Body elongated and not elevated,  
 First dorsal behind nape.  
 Breast granulated,  
 First dorsal remote from nape.  
 Lower jaw received within upper. Dorsal fins contiguous.  
 Thoracic plates four, forming a square,  
 Thoracic plates numerous,  
 Jaws subequal,  
 Body thick. Vomerine and palatine teeth,  
 ? Body compressed,  
 Lower jaw longest. Dorsal fins contiguous,  
 Dorsal fin single,  
 Teeth on the jaws alone,  
 Teeth on the jaws, vomer and palatines,
- I. AGONINÆ.  
*Podotheci*.  
 1. *Podothecus*.  
*Hypsagoni*  
 2. *Hypsagonus*.  
*Agoni*.  
 3. *Hippocephalus*.  
 4. *Agonus*.  
 5. *Paragonus*.  
 6. *Agonopsis*.  
 7. *Leptagonus*.  
 8. *Brachyopsis*.  
 II. ANOPLAGONINÆ.  
 9. *Aspidophoroides*.  
 10. *Anoplagonus*.

## Genus PODOTHECUS Gill.

*Syn.* *Podothecus* Gill, Proc. Academy of Natural Sciences of Phila., vol. xiii. p. 77, 1861.

Body much compressed anteriorly and with the width subequal, or imperceptibly decreasing to the caudal fin. The caudal peduncle is slender, subequal and depressed. The dorsal outline is sigmoidally incurved towards the peduncle. The breast is flattened, triangular, covered with a median and, on each side, a lateral row of moderate plates; the central plates are hexagonal. Head parallelopiped, much compressed, and with the width subequal. Profile with a very decided oblique sigmoidal curve. Superciliary and occipital crests well developed and spinigerous. Temporal crests lateral. Snout prominent, depressed, and with two spines on each side, one horizontal and the other vertical or recurved. Mouth wholly inferior, with the periphery oblong semi-oval. Lower jaw received within the upper. Teeth villiform, present only on the jaws. Angles of mouth furnished with numerous barbels. Dorsal fins separated by about three plates; the first, commencing behind the fourth pair of plates, is oblong but rather high, and sustained by about nine slender spines. The ventral fins are closely approximated and received in a longitudinal lanceolate groove. Each fin has apparently a spine and two simple rays.

## PODOTHECUS PERISTETHUS Gill.

The form of this species is quite similar to that of a species of *Peristethus* or *Peristedion*. The height is somewhat greatest just behind the bases of the pectoral fins, where it equals the distance between the rostral spine and the orbit; thence it quite regularly diminishes, but with a slightly sigmoid dorsal curve, the decrease being more rapid between the ends of the first and second dorsal; behind the latter it is much depressed and wider than high; the height very slowly diminishes towards the caudal. The greatest height equals 46-100 of the head's length; that behind the first dorsal, 37-100; in front of the anal, 32-100; and behind the second dorsal, 20-100.

The width very regularly and slowly decreases towards the caudal. In front of the bases of the pectorals it equals the height, or 46-100 of the head's length; behind the first dorsal it is less than the height at the same place,  
 1861.]

equalling 31-100 of the length of the head ; behind the second dorsal the width is greater than the height, and equals 21-100 of the head. At the fifth plate behind the latter the height is only equal to six-tenths of the width.

The sides between the superior and inferior lateral ridges are vertical ; the superior carina is straight and oblique to nearly the end of the second dorsal, and is then horizontal ; the spines only become developed under the end of the first dorsal ; they are small, compressed and acute. The inferior carina is straight on the first five plates, thence oblique to the vertical of the anal fin, and afterwards nearly horizontal ; its spines are like those of the superior carina. The space between the ridges at their commencement equals a quarter of the head's length, (25-100) ; that at the fifth plate of the lower carina, 15-100, and that above the first anal rays, 18-100. Behind the dorsal and anal fins they form nearly right angles with the dorsal and inferior surfaces of the caudal peduncle. The dorsal surface is nearly flat or slightly concave. The width between the dorso-lateral carinæ in front of the back is subequal, and equal to a fifth of the head's length, (21-100) ; it there becomes gradually narrow, and ends behind the second dorsal in an acute point, produced by the convergence of the carinæ. The width decreases more rapidly at the first than the second dorsal. The spine of the carinæ are most developed anteriorly and are obsolete behind.

The head has a paralleloiped form, like that of a *Trigloid* ; its occipito-nasal outline is sigmoidally curved ; its inferior surface plane. Its height at the nape equals 42-100 of its length ; behind the superciliary spine, 39-100 ; thence the sigmoidal curve is very oblique, the curve being increased by the development of the superciliary crests ; the spine in which each crest terminates is moderate, compressed and recurved ; the lateral occipital carinæ are well marked, slightly divergent, and end in spines similar to the superciliary. The head is widest at the opercular bones, where it equals 47-100 of the length ; the sides are nearly vertical. The interval between the superciliary crests equals a fourth of the head's length ; that between the occipital spines, 24-100.

The eyes are elliptical and of large size ; the distance of the orbit from the end of the rostral spine equals 47-100 of the length of the head ; the long diameter of the orbit equals 26-100, and the short one 21-100 of the same.

The suborbital bones are delicately waved and pectinated beneath, and have a submarginal ridge. The great suborbital bone has at the middle of its ridge a small, compressed, curved spine, from which granulated radiating striæ diverge on every side and cover the surface ; the height of the suborbital equals 16-100 of the head's length, while its length is 29-100 of the same. On the preceding bone is another smaller spine. The preoperculum is high, and its margin sigmoidal ; its crest is above the horizon of the suborbital one, well developed, and ends in an acute spine ; beneath the crest the bone is produced into an angle. Granulated radiating striæ proceed above and beneath from the commencement of the preopercular crest. The operculum is also ridged above and covered with granulated rays.

There are on each side two rostral spines ; the first is terminal, elongated conical, straight and horizontal ; the posterior is some distance behind, smaller and curved backwards. There are also two approximated curved frontal spines on an elevated base, and with three rows of granulations proceeding forward from each.

The mouth is placed quite far back, and the lower jaw is shortest ; the front of the latter is under or slightly behind the vertical of the prefrontal spines, and at a distance from the rostral spine equal to 32-100 of the head's length ; its periphery is semioval.

The angles of the jaws are furnished with many fleshy tentacles, and there are apparently smaller ones on the branchiostegal membrane.

The abdomen has a small azygous almost oblong quadrangular plate in

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front; behind but not contiguous are two hexagonal ones, elevated in the middle and with granulated rays; still further behind, and in front of the ventral furrow, is a fourth almost plain and transverse smaller plate. On each side of the mesial row are five others; the first meets the corresponding one on the opposite side, and is interposed between the first and second median plates; the fifth is smaller, and its angle only extends to the anterior angle of the ventral furrow; granulated rays diverge from or near the posterior borders.

The first dorsal fin commences behind the fourth pair of dorsal plates: it is oblong and placed between seven pairs of plates; its fourth, fifth and sixth spines are longest, and equal four-tenths (40-100) of the head's length; its first three gradually increase, and its last three decrease; all are slender.

The second dorsal is separated from the first by three pairs of plates and is placed between six; it has seven rays, all of which are articulated; the margin is decurved backwards; the longest ray exceeds that of the first dorsal, and the shortest is less than half.

The anal fin commences at a vertical drawn midway between the two dorsals, and has eight rays, each ray corresponding to a plate; all are simple and articulated; the third and fourth are longest, and equal four-tenths (40-100) of the head's; the first two rapidly increase. The margin behind is much decurved, the last ray having only a third of the length of the longest.

The pectoral fins are well developed, and reach behind to the vertical of the last dorsal spine; the angles are rounded; each fin has fourteen simply articulated rays.

The ventral fins are closely approximated and received in a lanceolate furrow; each has a short spine and articulated rays, the external of which is longest, and exceeds three-tenths of the head's length.

The anus appears to be between the fifth pair of plates behind the pectoral fins, and at the end of the ventral furrow.

The number of rays is as follows:

D. IX. 7. A. 8. P. 14. V. I. 2.

The color in alcohol is yellowish or reddish brown, with a darker margin on each plate. The rays of the pectoral fins were apparently banded at their base.

A single specimen of this most interesting fish was obtained at Simeahmoo by Dr. Kennerly. It is unfortunately in a very poor state of preservation, the head being much injured and partly fallen to pieces, the caudal fin and part of the peduncle lost, and the ventral fins have fallen out. Most of the parts of the head and the ventral fins are, however, preserved in the same bottle, and I have been thus enabled to render a sufficiently detailed and exact description. The specimen was probably about seven or eight inches long.

#### Description of a new generic type of BLENNOIDS.

BY THEODORE GILL.

The present species was discovered by Dr. Kennerly, the Naturalist of the North Western Boundary Survey, in the waters of Washington Territory, and will be illustrated in the forthcoming Report on the Fishes of the western coast of North America.

#### Genus ANOPLARCHUS Gill.

Body much elongated and compressed, with its height subequal. Scales very small and imbedded in the skin. Lateral lines and mucous pores absent or rudimentary. Head small, compressed and suboval. Snout convex. Eyes small. Mouth oblique and lateral. Teeth uniserial in each jaw, and of nearly uniform size. Palate edentulous. Branchial apertures separated by a moderate isthmus. Branchiostegal membrane with an acute emargina-  
1861.]

tion below and attached to the throat. Branchiostegal rays 5—5. Dorsal fin low, entirely spinous. Anal fin unarmed. Caudal small, entire. Pectoral fins moderate. Ventral obsolete.

Type *Anoplarchus purpurescens* Gill.

This genus is most nearly related to *Muraenoides* and *Apodichthys*, but is decidedly distinct from each.

It differs from *Muraenoides* by the uniserial teeth of the jaws and the unarmed palate, the attachment of the branchiostegal membrane to the throat beneath, and the consequent restriction of the branchial apertures to the sides, and the absence of anal spines as well as of ventral fins.

The genus *Apodichthys* agrees with *Anoplarchus* in the absence of the ventral fins, and of palatine and vomerine teeth, but is readily distinguished from it by the character of the dentition and by the presence of a large calamiform spine behind the anus and separated from the anal fin, as well as by the continuity of the branchial apertures beneath.

#### ANOPLARCHUS PURPURESCENS Gill.

The general form resembles that of a *Muraenoides* or *Apodichthys*. The height before the dorsal fin nearly equals a ninth of the total length, (11-100), and its greatest height in front of the anus an eighth ( $12\frac{1}{2}$ -100) of the same. The caudal peduncle behind the last dorsal spine is about a third of the greatest height, or a twenty-fifth (4-100) of the length.

The head, from the closed lower jaw to the opercular angle, forms about an eighth (13-100) of the total length. The snout is convex; the interval between the snout or rather symphysis of the upper jaw and the orbit forms nearly a fifth of the length of the head; the distance between the orbits nearly equals a ninth. The diameter of the orbit equals the distance between the snout and orbit.

The dorsal fin commences above or slightly in advance of the pectoral fins, and at the commencement of the second eighth of the total length. The length of most of the rays averages about a third of the head's length or a twenty-fifth of the total.

The anal fin commences immediately behind the anus; it commences at a distance from the snout equal to thirty-seven hundredths of the entire length. The average height equals a third of the length of the head.

The caudal fin is convex behind, and forms nearly a twelfth (8-100) of the total length.

The pectoral fins are normally developed, convex behind, and nearly equal in length to half of the head, (6-100).

D. LVI. A. 41. C. 2, 7, 6, 2. P. 1, 11.

The color of the species is dark purple. An oblique light purple band crosses the cheek from the eye and is margined by a lighter line on each side, which separates it before from the dark narrower band behind the supra-maxillary bone, and another dark one behind which merges into the light purple color of the rest of the head. The pectoral fin has a black spot at the middle of its base. The caudal fin has several transverse light brown lines, and a well defined one at its base; near the root of the upper and of the lower rays respectively, there is also a blackish dot, encircled by light brown.

Total length, (3 8-10).....	100
Body—Height before dorsal.....	11
“ before anus.....	$12\frac{1}{2}$
“ behind last dorsal spine.....	4
Width at pectorals.....	6
Head—Greatest length.....	13
Interval between snout and orbit.....	$2\frac{1}{2}$
Width between orbits.....	$1\frac{1}{2}$

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Diameter of eye.....	2 $\frac{1}{3}$
Dorsal—Distance from snout.....	13
Length of first spine.....	2 $\frac{1}{3}$
“    second spine.....	4
“    spine over anus.....	4
Anal—Distance from snout.....	37
Height at third ray.....	4 $\frac{1}{2}$
“    at middle.....	4 $\frac{1}{2}$
Caudal—Length.....	8
Pectoral—Length.....	6

### Monograph of the Tridigitate URANOSCOPOIDS.

BY THEODORE GILL.

In the “Synopsis of the Uranoscopoids” recently published in the Proceedings of the Academy of Natural Sciences, the discovery of two new species of the genus *Dactyloscopus* was noticed, and a promise was made to describe them at another time. The present memoir is accordingly devoted to the description of the three species of that genus now known and of an additional species representing a fourth very distinct group of the same family.

The discovery of the last mentioned type has necessitated a revision of the characters formerly given to the subfamilies of the Uranoscopoids, the form of the head presenting quite a decided difference. All of the species formerly known were distinguished by the cuboid form of the head, the superior surface of which was nearly flat; the eyes were also entirely superior and next to the sides, and the cleft of the mouth was almost vertical. Such were the characters common to all the species then known. But when engaged on the present monograph, two fishes were found which were readily ascertained to be most nearly allied to the *Dactyloscopi*, but which were distinguished from them by the remarkable shape of the head. The bones are so modified that instead of producing the normal cuboid form, they cause an elongated conical one, the height and width gradually decreasing toward the snout. The interorbital area is also very slight on account of the excessive narrowness of the frontal bones. Yet, notwithstanding such remarkable differences of form, none can remain doubtful concerning the affinity of the species to the *Dactyloscopi*. The general form of the body, the squamation, the character of the lateral line, the fringed opercula and lips, the membranous extension of the suboperculum and interoperculum, the character of the fins and all other essential characters are reproduced in the two forms. The arguments that were formerly adduced in favor of the pertinence of the *Dactyloscopi* to the same family as the *Leptoscopi* are equally applicable to the newly discovered form. The relative position of the dorsal and anal fins is even similar to that of the *Leptoscopi* and different from that characteristic of the *Dactyloscopi*. Three peculiar modifications of the elongated Uranoscopoid form are now known, and the propriety of referring them to a family distinct from the comparatively short Uranoscopoids, with more or less mailed heads, is correspondingly increased. But, for the present, all are still retained under the same family.

The following diagnoses of the subfamilies and their genera are given so as to distinguish them among the other groups.

#### Subfamily DACTYLOSCOPINÆ Gill.

*Dactyloscopinæ* Gill, Proceedings of the Academy of Natural Sciences of Philadelphia, 1859, p. 133.

“ Gill, op. cit., 1861, p. 116.

The body is moderately elongated.

1861.]

The scales are moderate or rather small, cycloid, with subcentral or slightly eccentric nuclei, and with concentric striae. The lateral line runs for a short distance anteriorly on the sides of the back, is then much deflected, and then runs along the middle of the side to the caudal fin and is again deflected.

The head is cuboid and nearly plane above, and covered with the smooth and naked skin above as well as on the sides. The operculum is fringed behind; the preoperculum unarmed. The suboperculum and interoperculum have membranous extended borders.

The mouth is very oblique and nearly vertical. The lower jaw closes in front of the upper, and its periphery is semioval. The membranous fold between the limbs of the lower jaw is well developed, and conceals the front of the branchiostegal membrane.

The dorsal fin commences near the nape, and is continued nearly to the caudal fin; its rays in front are simple; the others are articulated.

The anal fin commences under the anterior portion of the anal fin, and is also much elongated and continued nearly to the caudal. The ventral fins are approximated, and each is composed of three simply articulated rays.

The relation of this subfamily to the Leptoscopinae has been previously exposed. The difference consists of the presence in the *Dactyloscopi* of only three articulated rays to the ventral fins instead of one spinous and five branched as in the Leptoscopinae. The dorsal of the latter is also as short or shorter than the anal and commences some distance behind the nape; in *Dactyloscopus* the dorsal fin commences immediately behind the nape, and is longer than the anal. The *Dactyloscopinae* are confined to the tropical American seas, while the *Leptoscopinae* are represented in the seas around the islands of Australia and New Zealand.

#### Genus DACTYLOSCOPUS Gill.

*Dactyloscopus* Gill Proceedings of the Academy of Natural Sciences of Philadelphia, 1859, p. 132.

" Gill, op. cit., 1861, p. 117.

The body is moderately elongated, its greatest height equalling about a sixth or seventh of the extreme length.

Head cuboid, oblong and nearly flat above. Eyes small and subcircular, separated by a considerable space, the frontal bones being of moderate width.

Mouth nearly vertical. Lower jaw not dilated beneath or emarginated in front, and without barbels. Intralabial filament obsolete.

Teeth villiform and only present on the jaws.

Dorsal fin with its origin near the nape, and with its first ten or twelve rays simple, and the rest articulated. Anal fin commencing under the anterior part of the dorsal.

Type. *Dactyloscopus tridigitatus* Gill.

#### DACTYLOSCOPUS TRIDIGITATUS Gill.

*Dactyloscopus tridigitatus* Gill, Proceedings Academy of Natural Sciences of Philadelphia, April, 1859, p. 132.

The greatest height is contained 14-100 times in the total length. The head from the closed lower jaw to the end of the bony operculum forms 19-100 of the length; its elevation above the inferior preopercular margin equals 11-19, and the height at the articulation of the lower jaw 9-19 of its length. Its greatest width equals 10-19 and that behind the eyes 7-19 of the same. The dorsal fin commences at the 18-100ths of distance from the snout. The caudal fin forms an eighth of the total length. The pectorals equal 16-100 of the same. The anterior part of the lateral line runs through eleven scales, is then deflected and runs very obliquely on four scales, and is thence continued along the fifth row from the back through thirty.

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D. 12, 28. A. 2, 32. C. I. 1, 8, 1, I. P. 13. V. 3.

The color appears originally to have been nearly uniform and whitish blue or almost white on the trunk; when the scales are lost the apparent color is grayish, marbled or spotted with white. The head is whitish or grayish above, variegated with coarse meandering darker lines, which partly also extend on the suborbital region and cheeks. The preoperculum, and other opercular bones are mostly immaculate. The fins are also immaculate.

The body is slender and very gradually and with much regularity declines towards the caudal fin; it is also much compressed, especially posteriorly. The height is greatest at the front of the dorsal fin, and is there nearly equal to a seventh (14-100) of the total length. The height behind the last dorsal ray exceeds little more than a fourth of the greatest, and only equals a twenty-fifth part (4-100) of the length. The thickness at the bases of the pectoral fins is contained twelve times (8-100) in the length.

The head is plane above and angulated at the sides of its superior surface. From the tip of the closed lower jaw to the margin of the bony operculum it constitutes nearly a fifth (19-100) of the extreme length. Its height between the crown and the inferior margin of the preoperculum is much less than two-thirds of its length (11-100 of the total). The height at the articulation of lower jaw nearly equals a half of the length (9-100 of the total). The thickness of the head is greatest close behind the preoperculum, and exceeds a half of the length, or one-tenth (10-100) of the total; it thence gradually diminishes to the obtuse snout; behind the eyes, it equals seven-tenths of the greatest width, or 7-100 of the total length.

The eyes are moderate, circular and entirely superior. The diameter of the orbit is contained more than six times in the head's length, and equals 3-100 of the total length. The distance between the eyes equals two-thirds of the diameter, and the distance from the symphysis of the intermaxillaries a diameter.

The posterior border of the basal ridge of the preoperculum is nearly vertical, and descends toward the angle, which is rounded. The width of the preoperculum is greatest at the angle between the ridge and the free margin; it is there a half greater than the diameter of the eye ( $4\frac{1}{2}$ -100 of the total length). Near the free margin of the preoperculum, there is a band of paired pores.

The dentary on its posterior part has three broad transverse channels. The opercular fringe is composed of about fifteen distinct and free filaments.

The dorsal fin commences at 18-100 of the length from the upper jaw, and has forty or forty-one rays; about twelve of these are simple and inarticulated, while the others are articulated, and divided on each side of the mesial line to the base, but so connected as to appear like simply articulated rays, especially from a lateral view.

The anal fin commences under the sixth or seventh ray of the dorsal; it has about thirty-four rays; the first two are simple and inarticulated; the rest are divided to their bases and articulated.

The caudal fin is narrow, rather long, truncated behind, and furnished with eight branched rays, two articulated and two simple ones. The fin forms nearly an eighth (12-100) of the total length.

The pectoral fins are acutely angulated; the superior rays rapidly increase towards the fifth, which is longest, and equals the sixth (16-100) of the total length; the rays beneath rapidly decrease, and the margin of the fin converges toward the base, which extends very obliquely forward.

The ventral fins are each composed of three articulated and stout rays, but which are attenuated at the extremities. The external ray is shortest; the median is little longer than the internal, and equals an eighth (12-100) of the total length.

The scales are of moderate size and regularly imbricated. The lateral line

runs along the second row of scales from the dorsal fin, through eleven scales, is moderately deflected on the eleventh, runs obliquely through four scales, and is again continued horizontally on the fifth row from the top through about thirty or thirty-one scales.

Total length, 3 inches,.....	100
Greatest height.....	14
Least height (behind last dorsal ray).....	4
Thickness at pectorals.....	8
Head—Length.....	19
Height over preoperculum.....	11
Thickness at preoperculum.....	10
“    behind eyes.. .. .	7
Height at eyes.....	9
Interorbital area.....	2
Eye—Diameter.....	3
Distance from snout.....	3
Dorsal—Distance from snout.....	18
Caudal—Length.....	12
Pectoral—Length.....	16
Ventral—Length.....	12

The *Dactyloscopus tridigitatus* is readily distinguished among its congeners by its color and the number of scales through which the anterior elevated portion of the lateral line runs. The body is also comparatively slender, and the head short and narrow. The dorsal likewise commences at a greater distance from the head than in its nearest relation.

This species appears to be quite extensively distributed through the Carribean sea. Three specimens, from which the species was originally described, were discovered at the island of Barbados. Another specimen is preserved in the Smithsonian Institution that was obtained at Garden Key, near the coast of Florida. Mr. Poey has also detected an individual of the same species on the Cuban coast, and has presented it to the Smithsonian Institution.

#### DACTYLOSCOPUS POEYI Gill.

The greatest height is contained 16–100 times in the total length. The head forms a fifth of the same; its height over the inferior preopercular border equals a half (11–20) and that at the eyes 9–20 of the length; its greatest width exceeds a half of its length, and that behind the eyes 8–20. The dorsal fin is distant a sixth (16–100) of its length from the snout. The anterior part of the lateral line runs through thirteen scales, is then deflected through three and afterwards runs along the fifth row from the back through about thirty-two.

D. 11, 31. A. 2, 32. C. 1, I. 8, I. 1.

The color is reddish brown, dotted with darker above the lateral line. The head is also blotched and dotted with darker, through which the ground color is exhibited in streaks and blotches, especially around the eyes. The operculum is variegated; the other opercular bones nearly immaculate.

The body has the same form as the *Dactyloscopus tridigitatus*, but is more robust; the greatest height exceeds a sixth of the total length, (16–100); the height at the caudal peduncle, behind the last dorsal ray, equals a fourth of the greatest length. The thickness at the breast equals two-thirds of the greatest height, (11–100 of the length).

The head is plane above and obtusely angulated at the sides of the plane. Its length constitutes a fifth (20–100) of the total. Its height between the crown and the inferior margin of the preoperculum exceeds half of its length, or 11–100 of the total. That at the articulation of the lower jaw does not equal half of the length, (9–100 of the total). The thickness of the head be-

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hind the preoperculum exceeds a half of its length, or a ninth (11-100) of the total ; that behind the eyes equals eight-elevenths of the greatest or 8-100 of the total length.

The eyes are similar to those of *Dactyloscopus tridigitatus*. The diameter of the orbit is contained nearly seven times (3-20) in the head's length, and equals 3-100 of the total. The distance between the eyes equals two-thirds of a diameter, and that from the snout a whole diameter.

The preoperculum has the same form and proportions as *Dactyloscopus tridigitatus*. The pores are very indistinct or obsolete.

The opercular fringe is formed by about eighteen filaments, the lowest of which are scarcely extended beyond the margin.

The commencement of the dorsal fin is distant from the snout a sixth (16-100) of the entire length. It has about forty-two rays, of which the first eleven appear to be simple and inarticulated, and the rest are divided as the typical species.

The anal fin commences nearly under the sixth ray of the dorsal fin ; it has about thirty-four rays, the first two of which are simple and inarticulated. The rest are branched.

The caudal fin has ten articulated rays, of which eight are branched and two simple ones, one above and another below.

The scales are of moderate size and regularly imbricated. Each one is short or little oblong, with the nucleus little eccentric and with well defined concentric striae on the whole surface ; there are no radiating grooves or ridges. The lateral line runs above through thirteen scales, is then deflected and continued very obliquely on three, and again runs through the fifth row from the back along about thirty-two scales to the caudal fin.

Total length, (2.6,).....	100
Greatest height.....	16
Height behind last dorsal ray.....	4
Thickness at pectorals.....	11
Head—Length.....	20
Height at preoperculum.....	11
Thickness at preoperculum.....	11
“    behind eyes.....	8
Height at eyes.....	9
Interorbital area.....	2
Eyes—Diameter.....	3
Distance from snout.....	3
Dorsal—Distance from snout.....	16
Caudal—Length, (assumed).....	12

This species is closely related to the *Dactyloscopus tridigitatus*, but is readily known by its color and the number of scales through which the anterior part of the lateral line runs, as well as by its stouter and more robust body, its longer and wider head and the less distance between the snout and the commencement of the dorsal fin. The caudal fin is mostly destroyed, and the above table of measurements has been calculated for the total length, on the supposition that the caudal fin, as in the type of the genus, bears the proportion to the entire length of twelve to a hundred. The pectoral and ventral fins have been also mutilated.

A single specimen of this species was obtained by my learned friend, the Professor of Zoology and Comparative Anatomy in the Royal University of Havana. In testimony of my appreciation of his labors to elucidate the natural history of Cuba, I have dedicated the species to him. The specimen has been presented to the Smithsonian Institution.

DACTYLOSCOPUS PECTORALIS Gill.

The greatest height is less than a seventh (15-100) of the total length. The 1861.]

head forms more than a fifth (21-100) of the same ; its greatest height above the preoperculum equals 12-21, and that at the articulation of the lower jaw 10-21 of its length. Its greatest width equals two-thirds (14-21), and that behind the eyes more than one-third (8-21) of its length. The dorsal fin commences at the eighteen-hundredths of the length. The caudal fin forms 14-100 of the total length ; the pectoral 22-100. The anterior part of the lateral line runs through thirteen scales, is deflected on three, and then continued along the fifth row from the back through twenty-four.

D. 12, 22. A. 2, 26. C. 1, 1, 4, 4, 1, 1. P. 12. V. 3.

The color is a light brownish yellow, with dark spots on the back, arranged in lines forming the outlines of about six quadrangular areas, from the angles of which irregular lines proceed downwards and converge towards those departing from the angles of the adjoining areas. Such is the pattern of coloration, but it is subject to considerable irregularity. More scattered and irregular spots or dots are often present beneath the lateral line. The head is rather lighter and sometimes suffused with pink above. A transverse band or blotch divided in front is present between the orbits behind. Four rays also diverge in pairs from each orbit ; one from the front ; a bifurcated one from the antero-inferior angle ; and two from the posterior border. On the crown are two dark spots. There is a transverse sinuated nuchal line. Behind and below the orbit is a whitish area, with a dark spot before and behind. The upper angle of the operculum is whitish, bounded in front by a dark line or spot.

The height behind the nape is less than a seventh of the total length (15-100). That at the caudal peduncle behind the last dorsal ray equals a third of the greatest, (5-100 of the length). The thickness at the bases of the pectorals equals 12-100 of the length.

The head is not so plane as in the Caribbean species, and the sides less angulated. The length from the tip of the lower jaw to the end of the bony operculum constitutes more than a fifth (21-100) of the total. Its height between the crown and the inferior margin of the preoperculum exceeds twelve-hundredths (12-100) of the total length. The height at the articulation of the lower jaw equals a tenth (10-100) of the same. The width of the head behind the preoperculum equals a seventh (14-100) of the total length, while the width behind the eyes, is eight-fourteenths of the greatest, or 8-100 of the length.

The eyes are small, the diameter equalling a tenth (7-21) of the head's length ; they are separated from each other by a space equalling a diameter, and their distance from the upper jaw or snout is equal to a seventh (3-21) of the head's length.

The preoperculum has nearly the same form as that of *Dactyloscopus tridigitatus*, but it is rather broader at the angle ; the pores are well developed.

The opercular fringe is formed by about eleven or twelve free filaments.

The dorsal fin commences at 18-100 of the length from the snout, and has about thirty-four rays, the first twelve of which are apparently simple and articulated.

The anal fin commences nearly under the sixth or seventh dorsal ray, and has about twenty-eight rays, the first two of which are simple.

The caudal fin forms a seventh (14-100) of the total length. It has eight branched rays, two simply articulated ones, and two simple, one above and one below.

The pectoral fins have twelve rays, the fifth of which is longest, but the fourth and sixth are also much longer than the adjoining ones. The longest exceeds in length a fifth (22-100) of the entire length.

The ventral fins are similar in structure to those of its allies. The internal ray is as long or longer than the median, and equals an eighth (12-100) of the total length.

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Total length, 1.7½,.....	100
Greatest height.....	15
Height behind last dorsal ray.....	5
Thickness at pectorals.....	12
Head—Length.....	21
Height over preoperculum.....	12
Thickness at preoperculum.....	14
“    behind eyes.....	8
Height at articulation of lower jaw.....	10
Interorbital area.....	2
Eye—Diameter.....	2
Distance from snout.....	3
Dorsal—Distance from snout (symphysis).....	18
Caudal—Length.....	14
Pectoral—Length.....	22
Ventral—Length.....	12

This species is very distinct from the two West Indian species of the genus. It is readily distinguished by its different proportions. The head is longer, wider and higher than in its congeners; the caudal fin and especially the pectorals are larger, the number of dorsal and anal rays less, and the number of scales through which the posterior or median part of the lateral line runs is different. It is also readily recognizable by its different colors. The size to which it attains is much less, the average length being little more than an inch and a half.

Three specimens were obtained by Mr. John Xantus, at Cape St. Lucas, and have been sent by that indefatigable naturalist to the Museum of the Smithsonian Institution.

#### Subfamily MYXODAGNINÆ Gill.

The body is considerably elongated, the length being about ten times as great as the height.

The scales are moderate or rather small, cycloid, and with subcentral or slightly eccentric nuclei and concentric striæ. The lateral line at first is on the side of the back, but is soon deflected and again runs in a straight line along the middle of the sides towards the caudal fin; then its end is again deflected.

The head is oblong or rather elongated, conical in profile, and more or less transversely arched above. The skin is smooth. The operculum is fringed behind. The preoperculum unarmed. The suboperculum and interoperculum have moderate or rudimentary extended membranous borders.

The mouth is moderately oblique and never subvertical. The lower jaw is prominent.

The membranous fold between the limb of the lower jaw is small or rudimentary and only developed anteriorly.

The dorsal fin is much elongated, but commences far from the nape, and is as short as, or shorter than, the anal. It arises behind the vertical of the anus.

The anal fin is very elongated.

The ventral fins are approximated, and each has three simply articulated rays.

This group is very closely related to the *Dactyloscopinæ*, but differs so much in the form of the head that its affinities at first might well be overlooked.

#### Genus MYXODAGNUS Gill.

The body is quite slender, the greatest height being contained about ten times in the length.

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Head rather elongated and acutely conical, about twice as long as high. Eyes large and elliptical, and very closely approximated. The frontal bones are extremely narrow.

Mouth oblique. Lower jaw projecting much beyond the upper and furnished with a short compressed and wide flap or barbel in front of the symphysis.

Villiform teeth present only on the jaws.

Dorsal fin behind the vertical of the anus, and furnished with simple and articulated rays. Anal fin as long as or longer than the dorsal.

#### MYXODAGNUS OPERCULARIS Gill.

The body is highest in front of the dorsal fin, and nearly equals at that place a tenth of the total length; thence it regularly declines towards the caudal fin, and, behind the dorsal, is less than a third of the height in front. The width at the bases of the pectorals is equal to two-thirds of the greatest height, or 6-100 of the length.

The head is acutely conical and elongated; from the tip of the lower jaw to the end of the bony operculum it forms a sixth (17-100) of the entire length; from the front of the upper jaw to the same place, 16-100. Its greatest height at the vertical of the preopercular margin exceeds a half (9-17) of its length; that behind the eyes more than a third, (6-17). The profile is nearly straight, but very slightly concave in front of the eyes. The crown is transversely arched and smooth. The width at the preoperculum equals 7-17 of its length; the width behind the eyes a quarter of the same. The frontal bones between the eyes are exceedingly narrow, so that the orbits appear to be separated by little more than a mere septum.

The eyes are longitudinally elliptical and of large size. The long diameter of the orbit nearly equals the thickness behind, or quarter of the head's length. The distance between the snout or symphysis of the upper jaw and the orbit equals three-fourths of a diameter.

The posterior margin of the preoperculum is much less than the inferior and nearly vertical; the latter is oblique. The breadth is greatest at the angle. The pores are obsolete. The postorbital or temporal ridge is nearly as long as the diameter of the orbit.

The opercular fringe is composed of six or seven short filaments. The membranous extensions of the subopercular and interopercular bones are moderate and rather stiff.

The dorsal commences behind the vertical of the anus and the end of the first fourth of the total length, and behind the vertical of the posterior margin of the seventh scale of the lateral line. Its height at the middle equals a half of the greatest height of the body; there are thirty-six rays, none of which appear to be divided, and the articulation is itself almost obsolete.

The anal fin commences in front of the dorsal and before the end of the first fourth (23-100) of the length; about two rays are in advance of the dorsal. The height at the middle equals seven-tenths of the greatest height of the body. There are thirty eight rays, the first two of which appear to be simple, and the rest are simply articulated.

The caudal fin forms an eighth (12-100) of the total length. It has eight articulated rays forked at its terminal half, two simply articulated rays and two short simple ones.

The pectoral fins are angulated behind by the extension of the sixth as well as of the fifth and seventh rays. The superior four rapidly increase towards the fifth. The margin of the fin beneath is much curved forwards, the rays rapidly decreasing. The longest ray exceeds a fifth of the total.

The ventral fins have each three simply articulated and rather stout rays; the median is longest and equals a third of the pectoral's, or 7-100 of the total length.

The scales are of moderate size, finely striated concentrically, and arranged

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in eleven rows on each side. The lateral line runs through twelve on the sides of the back, is then deflected through three, and thence runs along the fifth row from the back through thirty-six.

D. 36. A. 2, 36. C. I. 1, 8, 1, I.

The color is a light yellowish brown, rendered darker on the back by congregations of dark dots on the scales. There is a margaritaceous spot behind and beneath the eye, and the operculum is also colored in the same manner.

Total length, 2.3.....	100
Greatest height.....	9½
Height behind dorsal fin.....	3
Thickness of pectorals.....	6
Head—Length from lower jaw to bony operculum.....	17
“    from upper jaw.....	16
Height at preoperculum.....	9
“    behind eyes.....	6
Thickness at preoperculum.....	7
“    behind eyes.....	4
Eye—Diameter.....	4
Distance from snout.....	3
Dorsal—Distance from snout.....	25
Anal—Distance from snout.....	23
Caudal—Length.....	12
Pectoral—Length.....	21
Ventral—Length.....	7

This species is a native of the waters of Lower California. Several specimens were obtained by Mr. John Xantus at Cape St. Lucas, and are now preserved in the Museum of the Smithsonian Institution.

### Synopsis of the POLYNEMATOIDS.

BY THEODORE GILL.

The family of Polynematoids has been recently established as now accepted, and its limits very accurately defined by Dr. Günther in his catalogue of the Acanthopterygian fishes of the British Museum. The principal characteristics by which its representatives can be at once recognized are the free filaments on each side of the breast below the pectorals, the protuberant snout, distant dorsal fins, and the abdominal position of the ventrals. The family characters in detail are the following :

#### Family POLYNEMATOIDÆ Bleeker.

Polynematoidæ *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii.  
Polynemidæ partim *Richardson*, &c.  
Percidæ pt. *Cuvier*, &c.

Body oblong or moderately elongated and highest over the anus, which is subcentral. Caudal peduncle oblong and robust. Scales regularly imbricated, generally ctenoid and mucronated, and of moderate or rather small size, extending on the head and fins.

Lateral line continuous and nearly straight. Continued on the caudal fin. Head oblong, moderate or rather small, compressed and slowly decreasing in size towards the snout, which is high and protuberant. Eyes moderate or large, and wholly or mostly anterior. Nostrils double. Suborbital bones very low; none articulated with the preoperculum. Opercular bones normally developed. Suboperculum oblique and forming the posterior angle. Mouth moderately oblique, and continued under the eyes behind. Teeth acute, always present on the jaws, and generally on the palate. Branchiostegal

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membrane deeply and acutely emarginated beneath, and with a very narrow free border behind. Branchiostegal rays seven on each side.

Dorsal fins two and entirely separated. The first with from five to nine spines; the second quite remote from the first and short, with most of its rays branched. Anal fin short or oblong. Caudal fin emarginated or forked. Pectoral fins inserted low on the humeral cincture, and normally developed; its angles are obtuse. Beneath and in front are many (3—14) free articulated filaments. Ventral fins thoracic and under the spinous dorsal; each has a spine and five branched rays, the first or second of which is longest.

The muciferous excavations and channels of the bones of the head are well developed.

The vertebral column is composed of about twenty-four or five vertebræ, nine or ten of which bear ribs.

The stomach is cœcal; the pyloric cœca are present generally in moderate number, rarely numerous.

The air bladder is very variable in form, structure and development, and is sometimes absent. Its modifications do not appear to be even coincident with generic characters.

The nearest allies of this family appear to be the Sciænoids. This affinity is indicated by the presence in both of the muciferous excavations of the skull, the extent of the squamation and the obliquity of the rows of scales, the weakness of the dorsal and anal spines, &c. The number of vertebræ and the character of the intestinal canal are also nearly similar to those of the Sciænoids. The most distinctive characters of the present family have been indicated in the preliminary remarks.

On the other hand, they resemble the Mugiloids by the interval between the dorsal fins, and even in some degrees by the form, squamation and position of the ventral fins.

The following analytical table indicates the most distinctive features of each genus.

Axial twice as long as second dorsal. Preoperculum entire,	POLYNEMI.
Palatine and pterygoid teeth. No vomerine teeth. Pectoral filaments 5,	1. Polynemus.
Second dorsal and anal fins equal. Preoperculum serrated,	TRICHIDIONTES.
Palatine, pterygoid and vomerine teeth. { Pectoral filaments 3—8,	2. Trichidion.
{ Pectoral filaments about 14,	3. Polistonemus.
Palatine teeth. No vomerine or pterygoid teeth. } Pectoral filaments 10—11,	4. Galeoides.

#### Group *POLYNEMI* Gill.

*Pinna analis* pinnâ dorsali longior, antice infra pinnam dorsalem. Preoperculum inerme.

Anal fin longer than the second, and with its anterior portion beneath it. Preoperculum entire and not dentated.

#### POLYNEMUS Gronovius.

*Polynemus Gronovius*, Museum Ichthyologicum, p. 31, 1754.

*Pentanemus Arledi*, in Seba's Locupletissimi Rerum Naturalium Thesauri accurata descriptio, &c., tom. iii. p. 74, 1758.

*Pentanemus Günther*, Catalogue of the Acanthopterygian Fishes, vol. ii. p. 330, 1860—61.

*Pinna analis* pinnâ dorsali duplo longior. Dentes velutini ossibus maxillaribus superiori inferiorique, palatinis et pterygoideis.

Body oblong and moderately compressed, covered with moderate scales.

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Head oblong, with the snout projecting. Preoperculum unarmed. First dorsal fin above the pectorals, and sustained by eight spines; second dorsal oblong. Anal fin elongated; its anterior half is mostly opposite to the dorsal fin. Pectoral filaments generally five and extremely elongated.

Type. *Polynemus quinquarius*.

The genus *Polynemus* as now restricted is quite different from that called by the same name by recent naturalists, its type not having been known to Cuvier and Valenciennes, and disagreeing in its generic characters with all the species referred by them to that genus. The present has the same limits as *Pentanemus* of Günther, but that name cannot be preserved.

The name of *Polynemus* was first introduced into Science by Gronovius, and must be retained for this genus, while almost all of the species which have been described by Cuvier and Valenciennes and subsequent authors as *Polynemi*, should be placed in a genus called *Trichidion*. Gronovius has, with his usual ability and accuracy, characterized the genus in his "Museum Ichthyologicum," and has referred to *Pentanemus*, a *manuscript* name of Artedi, which he has refused to adopt on account of its too exclusive character, and because it does not apply to a species figured by Edwards which was supposed to belong to the same genus.\* Gronovius has only described one species, which is the same as that known by Artedi, whose description and figure were published four years afterwards in the great Thesaurus of Seba. Gronovius indeed alludes, at the end of his description of that species, to the fish of Edwards, but the genus was established more especially for the species described, and was intended to supersede Artedi's unpublished name. His must be, therefore, evidently retained for the species described, while Artedi's must be considered as a synonyme. In no case could that of *Polynemus* be retained for the majority of the Polynematoids, for Klein had previously formed a genus to which he had given the name of *Trichidion*, which included such species.

#### POLYNEMUS QUINQUARIUS Linn.

*Polynemus Gronovius*.

*Pentanemus Artedi*.

*Polynemus quinquarius Linn.*, Systema Naturæ, vol. i. p. 521.

*Polynemus Artedii Bennett*, Proc. of the Committee of the Zoological Society of London, vol. i. p. 146.

*Polynemus macronemus Pel*, Bijdragen tot de dierkunde, vol. i. pp. 9, 10, pl. vi.  
*Habitat*.—West Indian seas and the western coast of Africa.

#### Group TRICHIDIONTES Gill.

Pinna dorsalis analisque subæquales, oppositæ. Preoperculum armatum.

Dorsal and anal fins nearly equal and opposite to each other. Preoperculum armed.

\* Ob nimis strictam Cl. Artedii denominationem, nomen *Pentanemi* displicet, quum sub eodem Genere militat *Paradisææ piscis Edwardi*, cui septem Appendices ad Pinna Pectoris, qui hinc inscribendus esset *Heptanemus*; verum ad evitandas plures confusiones, nomine parum generaliiori *Polynemi* nimirum, insignire non dubitavi. Nomen autem compositum est ex  $\pi\epsilon\alpha\nu\varsigma$  and  $\nu\acute{\iota}\mu\alpha\alpha$  filum, utpote a parte inferiore Pinnarum Pectoralium ossicula utrinque continet, quæ in aliis piscibus insolita sunt.

† *Polynemus macrophthalmus Bleeker*, Acta Societatis Indo-Nederlandica, vol. v. Zevende Bijdr. ichth. Sumatr. p. 10.

*Habitat*.—Sumatra.

The description is unknown to me, not having yet seen the fifth volume of the Acta.

## TRICHIDION (Klein.)

- Trichidion *Klein*, *Historiæ Piscium Naturalis promovendæ missus quintus*, p. 28, 1749.  
 Polynemus sp. *Gronovius*, *Linn.*, auct.  
 Polydactylus *Lacépède*, *Histoire Naturelle*.  
 Tringa sp. *Forster*.  
 Polynemus *Günther*, *Catalogue of the Acanthopterygian Fishes, &c.*, vol. ii. p. 319.  
 Trichidion *Gill*, *Catalogue of the Fishes of the Eastern Coast of North America*, p. 40.  
 Dentes velutini maxillis duobus et ossibus vomerino, palatinis et pterygoideis.  
 Filamenta pectoralia 3—8.

Body oblong, covered by scales of moderate size. Head oblong, and with a protuberant snout. Preoperculum serrated. Both jaws, the vomer, and the palatine and pterygoid bones armed with villiform teeth. First dorsal fin placed above the ventral fins, and sustained by seven or eight spines. Second dorsal and anal fins oblong, opposite and nearly equal. Pectoral filaments in moderate number, varying from three to eight in the known species.

Type. *Trichidion Plumieri*.

*Trichidion* includes all the species described by Cuvier and Valenciennes under the name of *Polynemus*, with the exceptions of their *Polynemus dekadactylus* and *P. emeadactylus*. Those fishes belong apparently to the same species, and have been united by Dr. Günther under the name of *Galeoides polydactylus*. The following is a list of the species described.

*Species with eight pectoral filaments.*

## TRICHIDION OCTONEMUS.

Polynemus octonemus *Girard*, *Proceedings of the Academy of Natural Sciences of Phila.*, 1858, p. 167.  
*Habitat*.—Texas.

## TRICHIDION OCTOFILIS.

*Habitat*.—Atlantic coast of North America.

*Species with seven pectoral filaments.*

## TRICHIDION PARADISEUS.

Polynemus paradiseus *Linn.*, *Systema Naturæ*, vol. i. p. 401.  
 Polynemus *Gronovius*, *Zoophylacium*? sp. 398.  
 Polynemus risua *Hamilton*, (*Buchanan*), *account of the Fishes of the Ganges*? p. 228.  
 Polynemus toposui *Hamilton*, (*Buchanan*), *op. cit.*, p. 232?  
 Polynemus aureus *Hamilton*, (*Buchanan*), *op. cit.*, p. 232.  
 Polynemus longifilis *Cuv. et Val.*, *Hist. Nat. des poissons*, tom. iii. p. 365, tom. vii. p. 512.  
*Habitat*.—East Indian seas and the mouths of rivers.

## TRICHIDION DUBIUS.

Polynemus dubius *Bleeker*, *Enumeratio Piscium hucusque in Archipelago Indico observatorum*, p. 39.  
*Habitat*.—Sumatra and Borneo.

## TRICHIDION MACRONEMUS.

Polynemus macronema *Bleeker*, *Natuurkundig Tijdschrift voor Nederlandsch Indie*, iii. p. 419, 1852.  
 Polynemus Borneënsis *Bleeker*, *Enumeratio Piscium hucusque in Archipelago Indico observatorum, &c.*, p. 39.  
*Habitat*.—Coast and rivers of Borneo.

## TRICHIDION OLIGODON.

*Polynemus oligodon* Günther, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 322.

*Habitat*.—Atlantic coast of tropical America.

## TRICHIDION PLUMIERI.

*Polynemus paradiseus* Bloch, Naturgeschichte der Ausländischen Fische, tom. xii. p. 28, tab. 402.

*Polydactylus Plumieri* Lacépède, Hist. Nat. des Poissons, tom. v. pl. xiv. fig. 3.

*Polynemus Americanus* Cuv. et Val., Hist. Nat. des Poissons, tom. iii. p. 393.

*Trichidion Plumieri* Gill, Catalogue of the Fishes of the Eastern Coast of North America, p. 40.

*Habitat*.—Caribbean Sea and perhaps the eastern coast of North America.

## TRICHIDION MULTIRADIATUS.

*Polynemus multiradiatus* Günther, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 324.

*Habitat*.—Chinese seas.

## TRICHIDION HEPTADACTYLUS.

*Polynemus heptadactylus* Cuv. et Val., Hist. Nat. des Poissons, tom. iii. p. 390.

*Habitat*.—East Indian seas.

## TRICHIDION MELANOCHIR.

*Polynemus melanochir* Cuv. et Val., Hist. Nat. des Poissons, tom. vii. p. 513.

*Habitat*.—East Indian seas.

*Species with six pectoral filaments.*

## TRICHIDION HEXANEMUS.

*Polynemus hexanemus* Cuv. et Val., Hist. Nat. des Poissons, tom. iii. p. 389.

*Habitat*.—East Indian seas.

## TRICHIDION PFEIFFERI.

*Polynemus Pfeifferi* Bleeker, Natuurkundig Tijdschrift voor Nederlandsch Indie, iv. p. 249, 1853.

*Habitat*.—Sea of Priaman, Sumatra.

## TRICHIDION SEXTARIUS.

*Polynemus sextarius* Bloch, Systema Ichthyologiæ, Schneid. ed. p. 18, tab. iv.

*Habitat*.—East Indian seas.

## TRICHIDION XANTHONEMUS.

*Polynemus xanthonemus* Cuv. et Val., Hist. Nat. des Poissons, tom. vii. p. 517.

*Habitat*.—Coast of Coromandel.

## TRICHIDION APPROXIMANS.

*Polynemus approximans* Lay & Bennett, Beechey's Voyage to the Pacific, Zoology, p. 57.

*Habitat*.—Western coast of Mexico.

## TRICHIDION KURU.

*Polynemus kuru* Bleeker, Natuurkundig Tijdschrift voor Nederlandsch Indie, deel iv. p. 609, 1853.

*Habitat*.—Sea of Ternate.

## TRICHIDION DIAGRAMMICUS.

*Polynemus diagrammicus* Bleeker, Bijdrage tot de kennis der Percoiden van den Malaijo-moluskschen Archipel, p. 60, in Verhandelingen van het Bataviaasch Genootschap, deel xxii.

*Habitat*.—Java.

1861.]

## TRICHIDION SEXFILIS.

*Polynemus sexfilis* Cuv. et Val., Hist. Nat. des Poissons, tom. vii. p. 515.  
*Habitat*.—Isle of France.

*Species with five pectoral filaments.*

## TRICHIDION INDICUS.

Indian Polyneme. }  
*Polynemus indicus*. } *Shaw*, General Zoology, vol. v. pt. i. pp. 226, 381.  
*Polynemus sele* *Hamilton*, (*Buchanan*), Account of the Fishes of the Ganges,  
 pp. 226, 381.  
*Polynemus uronemus* Cuv. et Val., Hist. Nat. des Poissons, tom. iii. p. 385.  
*Polynemus plotens* *O'Reilly*, Calcutta Journal of Nat. Hist. vol. iii. p. 450.  
*Polynemus gelatinosus* *McClelland*, Calcutta Journal of Nat. Hist. vol. iii.  
 p. 181.

*Habitat*.—East Indian seas and Australia, (*Günther*.)

The preceding appear to be the only names under which this species has been described. The names of *Polynemus sele*, *P. plebeius*, *P. lineatus* and *P. gelatinosus* have been so recorded in the synonymy by some authors as to lead to the inference that they had been applied to as many nominal species by *McClelland*. That Gentleman, however, expressly stated that they were synonyms of one species for which he proposed the name of *P. gelatinosus*.

## TRICHIDION TAENIATUS.

*Polynemus taeniatus* *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 526.  
*Polynemus lineatus* *Günther*, op. cit., vol. ii., p. 327, (not *Polynemus lineatus Lacépède*.)  
*Habitat*.—Seas of Amboyna and Guatacana.

## TRICHIDION MICROSTOMUS.

*Polynemus microstomus* *Bleeker*, Natuurkundig Tijdschrift voor Nederlandsch Indie, vol. ii. p. 217.  
*Habitat*.—East Indian Archipelago.

## TRICHIDION PLEBEJUS.

*Polynemus plebejus* *Linnaeus*, Systema Naturæ, *Gmelin* ed., p. 1401.  
*Polynemus lineatus* *Lacépède*, Hist. Nat. des Poissons, tom. v. pl. xiii. fig. 2.  
 Nilotic polyneme *Shaw*, General Zoology, vol. v. pt. 1, p. 151.  
*Trigla Asiatica* *Forster*, Descriptiones Animalium, &c., curante *Lichtenstein*, p. 236, 1844.  
*Habitat*.—East Indian seas.

*Species with four pectoral filaments.*

## TRICHIDION TETRADACTYLUS.

Four fingered polyneme, }  
*Polynemus tetradactylus*. } *Shaw*, General Zoology, vol. v. p. 155, 1804.  
*Polynemus teria* *Hamilton*, Account of the Fishes found in the river Ganges, &c., pp. 224, 381.  
*Polynemus sallah*, } *Cantor*, Journal of the Asiatic Society, vol. v.  
*Polynemus quadrifilis*, } p. 166.  
*Habitat*.—East Indian seas.

## TRICHIDION QUADRIFILIS.

*Polynemus quadrifilis* Cuv. et Val., Histoire Naturelle des Poissons, tom. iii. p. 390, vii. p. 518, pl. 68.  
*Habitat*.—Western coast of Africa.

*Species with three pectoral filaments.*

## TRICHIDION TRIDACTYLUS.

*Polynemus tridactylus* *Bleeker*, Bijdrage tot de kennis der Percoiden van

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den Malaijo-molukschen Archipel, p. 57, (in Verhandelingen van het Bataviaasch Genootschap, del xxii.

*Habitat.*—Seas of Batavia.

#### POLISTONEMUS Gill.

*Polyuemus* sp. *Schlegel, Pel., Bleeker, Günther.*

Dentes velutiui maxillis ambabus et ossibus vomeriuo, palatinis et pterygoideis. Filamenta pectoralia cerciter 14.

Body oblong, covered with small scales. Head oblong, with the snout projecting. Preoperculum serrated. Both jaws, the vomer, palatine and pterygoid bones provided with villiform teeth. First dorsal fin above the pectorals, and furnished with seven or eight spines. Second dorsal and anal fins oblong, opposite and nearly equal. Pectoral filaments numerous (about fourteen) and much elongated.

The present genus is closely allied to *Trichidion*, but is sufficiently distinguished by the greatly increased number of the pectoral filaments. The scales are also considerably smaller than those of the *Trichidions*.

POLISTONEMUS MULTIFILIS Gill.

*Polynemus multifilis* *Schlegel, Fauna Japonica Pisces, p. 29, (note); ib. in Bijdragen tot de dierkunde, vol. i. p. 11, pl. vi.*

*Polynemus quatuordecimalis* *Pel., Bijdragen tot de dierkunde, vol. i. p. 10.*

*Polynemus polydactylus* *Bleeker, Natuurkundig Tijdschrift voor Nederlandsch Indie, Jahrgang iii. 1852, p. 417.*

*Habitat.*—River and coast of Borneo.

#### GALEOIDES Günther.

*Galeoides* *Günther, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 332.*

*Polynemus* *Vahl, Bloch, Cuv. et Val.*

Dentes velutini solum maxillis ambabus et ossibus palatinis. Filamenta pectoralia cerciter 10 vel 11.

Body oblong and compressed, covered with moderate or rather large scales. Head oblong, with the snout high and obtuse. Eyes large. Preoperculum serrated. Both jaws and the palatine bones armed with villiform teeth; the vomer and pterygoid bones are edentulous. First dorsal fin above pectorals, sustained by about eight spines. Second dorsal and anal oblong, opposite and nearly equal. Pectoral filaments in moderate number, generally about nine or ten.

*Galeoides* is distinguished by the absence of vomerine and pterygoid teeth, and by the moderate size of the anal fin. Cuvier and Valenciennes have described two nominal species with those characteristics distinguished by the presence of nine or ten pectoral filaments. Dr. Günther has considered them as identical, and as there is every probability that, where the number is so increased as it is in this genus, there should be a slight variation in the number in the same species, we have concluded to adopt his views. We have only seen the variety or species with nine filaments.

GALEOIDES POLYDACTYLUS Günther.

*Polynemus polydactylus* *Vahl, in Skriv. Naturh. Selsk, vol. iv. p. 158.*

*Polynemus enneadactylus* *Cuv. et Val., Hist. Nat. des Poissons, tom. iii. p. 392.*

$\beta$  *Polynemus decadactylus* *Bloch, Naturgeschichte der Ausländischen Fische, taf. cccci.*

*Habitat.*—Western coast of Africa.

1861.]

*Synopsis of the Eastern American Polynematoids.*

## POLYNEMUS QUINQUARIUS Linn.

*Synonymy.*

- Polynemus *Gronovius*, Museum Ichthyologicum, vol. i. p. 31, No. 74.  
 Pentanemus *Artedi*, in *Seba's* Locupletissimi Rerum Naturalium Thesauri accurata Descriptio, p. 74, pl. xxvii. fig. 2.  
 Polynemus quinquarius *Linn.*, Systema Naturæ, ed. x. tom. i. p. 317, 1758.  
 " " *Linn.*, Systema Naturæ, ed. xii. tom. i. p. 521, 1766.  
 Le Pentadactyle *Daubenton et Haüy*, Encyclopédie Méthodique, tom. iii. pp. 292, 314, 1787.  
 Le Pentadactyle (P. quinquarius) *Bonnaterre*, Tableau Encyclopédique et Méthodique, &c., *Ichthyologie*, p. 182, pl. 74, 1788.  
 Polynemus quinquarius *Linn.* Systema Naturæ *Gmelin*, ed. (tom. i. pt. iii.) p. 1400. 1788.  
 " " *Artedi*, Genera Piscium *Walbaum*, ed. p. 630. 1792.  
 " " *Bloch*, Systema Ichthyologiæ, *Schneider* ed. p. 19, 1801.  
 Le Polynème pentadactyle } *Lacépède*, Histoire Naturelle des Poissons, tom.  
 Polynemus quinquarius } v. pp. 412, 415, 418, 1803.  
 Seban Polyneme }  
 Polynemus quinquarius } *Shaw*, General Zoology, vol. v. p. 149, 1804.  
 Polynemus *Artedii* *Bennett*, Proc. of the Committee, &c., of the Zoological Society of London, pt. i. p. 146.  
 Polynemus macronemus *Pel.*, Bijdragen tot de dierkunde, vol. i. pp. 9, 10, pl. vi.  
 Polynemus quinquarius, Catalogue of Fish, collected and described by *Gronovius*, now in the British Museum, p. 176.  
 Pentanemus quinquarius *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 331, 1860.

D. VI. 11. I. 15. A. II. 30.

The lateral line runs through seventy or more scales; above are six rows, and below seventeen rows.

There are five very long pectoral filaments, their length being twice as great as that of the body.

If the American and African representatives of this genus have been correctly referred to one species, the geographical range of that one is very wide. The habitat of the species was given neither by *Artedi* in the Thesaurus of *Seba*, nor by *Gronovius* in the Museum Ichthyologicum. It was first said to inhabit the American seas by *Linnaeus* in the tenth edition of his Systema Naturæ, and the same locality is given by *Gronovius* in a work that was long unprinted; but which has been recently published by the British Museum. If the American and African species are distinct, *Bennett's* name of *Polynemus Artedii* must be therefore retained for the latter. *Bennett* alluded to the discrepancies between the figures and descriptions of *Gronovius* and *Artedi*, and the characters of the African species, but as *Dr. Günther*, with specimens from both localities before him has unhesitatingly united them under one, without comment, it is probable that there is no real difference. The species may therefore for the present be combined.

## TRICHIDION OLIGODON Gill.

*Synonymy.*

- Polynemus oligodon *Günther*, Catalogue of the Acanthopterygian Fishes, &c. p. 332.

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*Doubtful Synonymy.*

- Polynemus virinicus* Linn., Systema Naturæ, ed. x. tom. i. p. 317.  
 “ “ Linn., Systema Naturæ, ed. xii. tom. i. p. 521.  
 Le Mango *Daubenton et Haüy*, Encyclopédie Méthodique, tom. iii. pp. 244, 314.  
 Le Mango (*P. virinicus*) *Bonnaterre*, Tableau Encyclopédique et Méthodique, &c., Ichthyologie, p. 182.  
*Polynemus virinicus* Linn., Systema Naturæ, Gmelin ed. (tom. i. pt. iii.) p. 1400. 1788.  
 “ “ *Artedi*, Genera Piscium, Walbaum ed. p. 630. 1792.  
 “ “ *Bloch.*, Syst. Ichthyologiæ, *Schneider* ed. p. 19. 1801.  
 Le Polynème mango } *Lacépède* Histoire Naturelle des Poissons, tom. v. pp. 413, 417, 418. 1803.  
*Polynemus mango* }  
*Virginian Polyneme* *Shaw*, General Zoology, vol. v. p. 156.

D. VIII. 1, 13. A. II. 15.

The lateral line runs through seventy scales; above it there are seven rows and beneath are fourteen. There are seven pectoral filaments of moderate length, and nearly coterminous with the pectoral fins. The villiform teeth of the palatine and pterygoid bones form a narrow band. The body is uniform silvery. The margins of the pectoral fins and top of the first dorsal are black, and the rest more or less minutely dotted with black, (Günther.)

This species has quite a large geographical range, having been discovered on the southern coast of Brazil (at Rio Janeiro) and at the West Indian island of Jamaica. It is perhaps also found on the coast of the Southern United States. Its radial formula better agrees with that assigned by Linnæus to his *Polynemus virinicus* than does the *Polynemus Plumieri*. It does not, however, appear to be admissible to retain the Linnæan name for the species, as there is much uncertainty about it, and the description of Linnæus is incorrect, a pointed tail being assigned to it. Such a character is almost impossible in a fish having the form of a *Polynemus*.

TRICHIDION PLUMIERI Gill.

*Synonymy.*

- Piracoaba* *Marcgrave*, Historia Naturalis Brasilæ, p. 176.  
 “ *Willoughby*, Hist. Piscium. (Lib. iv.) p. 204, tab. N. 13, f. 3. 1686.  
*Trichidion* *Klein*, Historia Piscium Naturalis promovendæ Missus quintus, p. 29. 1749.  
*Polynemus paradiseus* } *Bloch*, Naturgeschichte der Ausländischen Fische, Der Paradisfisch } tom. xii. p. 28, taf. cccii. (excl. syn.) 1793.  
*Polynemus paradiseus* *Bloch*, Systema Ichthyologiæ, *Schneider* ed. p. 18.  
*Polydactylus Plumieri* *Lac.*, Hist. Nat. des Poissons, tom. v. p. 419.  
*Paradise Polyneme* (part) *Shaw*, General Zoology, vol. iv. p. 147, pl. 118,  
*Plumier's Polyneme* *Shaw*, op. cit. vol. iv. p. 157. 1804.  
*Polynemus americanus* *Cuv. et Val.*, Hist. Nat. des Poissons, tom. iii. p. 393.  
 “ “ *Storer*, Synopsis of the fishes of North America, p. ,  
 ib. in Memoirs of the American Academy of  
 Arts and Sciences, vol. ii. p. 300. 1846.  
 “ “ *Schomburgh*, History of Barbados, p. 697. 1848.  
 “ “ *Hill*, Catalogue of the Fish of Jamaica.  
 “ “ *Guichenot*, Hist. physique politique et Naturelle de  
 l'île de Cuba, p. 44. 1853.

*Polynemus Plumieri* *Günther*, Catalogue of the Acanthopterygian Fishes, vol. ii. p. 321.

*Trichidion Plumieri* *Gill*, Catalogue of the Fishes of North America.

D. VIII. I. 12. A. II. 12—13.

The lateral line runs through about sixty scales or less; above it, there are six rows, and beneath, ten.

1861.]

The seven pectoral filaments are moderately long, and nearly coterminous with the fins. The villiform teeth of the palatine and pterygoid bones form a broad band. The pectoral fins are black.

The *Trichidion Plumieri* is generally distributed through the Caribbean sea, and appears to be there the most abundant species. Its claim to be considered as an inhabitant of the coast of the Southern United States is rather doubtful.

TRICHIDION OCTOFILIS Gill.

D. VIII. I. 11. A. II. 14.

The lateral line runs through sixty scales; there are six rows above and ten below.

The eight pectoral filaments are moderately elongated; the longest reaches midway between the two dorsal fins. The color is apparently a nearly uniform silver. The vertical fins, and especially the first dorsal, are punctulated with black. The pectoral fins are quite black.

The present species has been only found at New York.

TRICHIDION OCTONEMUS Gill.

*Synonymy.*

- Polynemus octonemus* Girard, Proceed. of the Academy of Natural Sciences of Phila., 1858, p. 167.  
 " " Girard, United States and Mexican Boundary Survey, Ichthyology, p. 19, pl. x. figs. 5-9.  
 " " Günther, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 320.

D. VIII. I. 12. A. II. 13.

The lateral line runs through sixty or sixty-two scales; the scales themselves are arranged in seventeen longitudinal rows, of which six are above and ten beneath the lateral line.

There are eight pectoral filaments, the upper and longest of which extend behind the first rays of the anal fin. The color of the body is silvery on the sides, and light brownish yellow on the back above the lateral line. The fins are whitish and immaculate.

This very distinct species has been as yet only detected in Texas.

*Description of Trichidion octofilis, a new species.*

TRICHIDION OCTOFILIS Gill.

The body has the same ordinary form and degree of elongation as its congeners. The greatest height surpasses a quarter of the entire length from the snout to the end of the median caudal rays (27-100); the least height of the caudal peduncle does not quite equal an eighth of the total length (12-100).

The length of the head exceeds a quarter of the total (26-100), and is much greater than its height. The snout is much produced; the distance between its extremity and the anterior margin of the orbit is equal to a sixth or seventh of the length of the head (4-100); that between the snout and the margin of the preoperculum above its angle equals seventeen twenty-sixths of the same (17-100). The eyes are large; the longitudinal diameter of the orbit is equal to more than a quarter of the head's length (7-100). The interorbital area equals the orbit's diameter. The front of the lower jaw is at the vertical from the anterior border of the eye. The upper maxillary, as in all the species of the family, passes far behind the orbit, and is contained nearly two and two-third (2.8-11) times in the head's length. The preoperculum has a larger spine at its angle, and its posterior margin is pectinated.

The first dorsal fin is subfalcate; it commences behind the vertical from the seventh scale of the lateral line; the length of its base nearly equals a ninth

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of the total (15-100) ; its first spine is, as usual, rudimentary ; its second and third are nearly equal, and each is contained six and two-third times in the total length (11-100) ; its last spine is less than a third as long as the second. The second dorsal has a longer base than the first (13-100) ; its longest ray exceeds  $6\frac{2}{3}$  of the total length (15-100) ; its last one exceeds a fifteenth of the same ( $6\frac{1}{2}$ -100). The interval between the two dorsals is nearly equal to a sixth of the total length (16-100).

The anal fin is subfalciform like the second dorsal ; its length nearly equals a sixth of the total (16-100) and the interval between the dorsal fins ; its longest ray, when entire, probably equals the same (in specimen (14-000), and the last a half of it.

The caudal fin has the usual form ; its median rays equal a tenth (10-100), and its longest nearly two-sevenths (28-100) of the total length.

The pectoral fins are also proportioned like those of the other species ; their greatest length exceeds a fifth (21-100) of the total.

There are eight pectoral filaments ; the second superior one is slightly longest, and extends nearly to the vertical from the middle of the interval between the dorsal fins ; its length nearly equals two-sevenths (28-100) of the total ; the inferior or shortest has about half the length of the longest (14-100).

The ventral fins are situated under the anterior or median spines of the first dorsal ; the length of the spine little exceeds a seventeenth (6-100) of the total ; that of the external branched ray nearly equals a ninth (11-100), and that of the interval a tenth (10-100) of the same.

The radial formula follows :

1st. D. VIII. 2d. D. I. 11. A. II. 14.

The lateral line runs through about sixty scales ; there are six rows above, and apparently ten below.

The color appears to have been silvery. The vertical fins, especially the first dorsal, are punctulated with black. The pectoral fins are almost totally black.

Total length $7\frac{1}{2}$ inches.....	100
Greatest height.....	27
Least height.....	12
Length of head.....	26
Distance between snout and preoperculum.....	17
"    "    "    orbit.....	4
Diameter of orbit.....	7
Distance between orbits.....	7
Length of first dorsal fin.....	11
"    second spine.....	15
"    last spine.....	$4\frac{1}{2}$
Length of second dorsal fin.....	13
"    longest ray.....	15
"    last ray.....	$6\frac{1}{2}$
Distance between dorsals.....	16
Length of anal fin.....	16
"    longest ray.....	14
"    last ray.....	8
Length of central caudal rays.....	10
"    longest caudal rays.....	28
Length of pectoral fins.....	21
"    longest pectoral filament.....	28
"    shortest pectoral filament.....	14
Length of ventral spine.....	6
"    external ventral ray.....	11
"    internal ventral ray.....	10

A single specimen of this new species was obtained several years ago at New York, and is now in the possession of Mr. J. Carson Brevoort, to whom I am indebted for the privilege of describing it. The species is readily distinguished from all its congeners, except *Trichidion octonemus*, by the number of its pectoral filaments. From that species, it is very distinct, the color being quite different and the pectoral filaments themselves more elongated. Its affinity with the *Trichidion Plumieri* is greater, its color being nearly similar, but that species is distinguished from the present by the number of its filaments and its proportions.

Homoptera of the North Pacific Exploring Expedition under Com'rs. Rodgers and Ringgold.

BY P. R. UHLER.

PLATYPLEURA Amyot et Serv.

P. FENESTRATA.—PICEOUS: head tawny, with a black band, which is quadrately prolonged backwards upon the middle to the base, also a linear prolongation scarcely half way between the middle and the eyes, surface behind the eyes, the interior margin of the eyes connecting with the band, and an irregular spot each side of the front, black; vertex yellowish, with a transverse black spot, face blackish, covered each side with golden pubescence, the lateral margins, a large spot at base, and the transverse rugæ interruptedly yellow; rostrum yellow, tinged with piceous at tip; stemmata yellow with a black disk; basal joints of the antennæ piceous, remaining joints —: prothorax tawny, the posterior lobe olivaceous, a longitudinal spot behind the head, an anteriorly trifurcate one against the posterior lobe, and the lateral sub-margin black; mesothorax tawny, with four triangular black spots, of which the two interior ones are not more than one-half the length of the others, a longitudinal spot upon the middle, which is dilated each side behind, and a round impressed point each side of it, also black, the exterior triangular spots are connected posteriorly with a piceous spot, which occupies the transverse excavation; metathoracic cross broadly emarginated posteriorly: tergum blackish-piceous, clothed each side with golden pubescence, the posterior margins of the basal segments each side, and the drum-covers yellowish, the posterior margins of the segments ciliated with whitish hairs; venter pale piceous, the segments margined with yellowish, opercles yellowish, pubescent, blackish at base; pectus densely yellowish pubescent; legs pale piceous, tips of claws black; fore wings tawny upon the corium, subhyaline from thence to tip, a broad brown wavy band traversing the wing at the middle of the front areolet, the basal areolet, a spot upon the costal margin not far from the base, and another near the apex of the front areolet, deep brown, a dusky band traverses the wing at the middle, and vestiges of the same color are continued against the corium; a dusky cloud towards the apex extends more than half way across the wing, and a smaller dusky spot at tip is subconfluent with the former, the tips of the longitudinal veins at the exterior margin have a series of geminate brown spots, veins tawny-piceous towards the tip; hind wings tawny-orange, the veins deeper, a brown transverse spot beyond the costal middle, and the exterior margin broadly and wavedly, from the spot, brown, nervures brown, the one separating the flap broadly margined with dusky: coxal valves long, very narrow, triangular, subquadrately dilated at base.

Length 10 lines. Alar expanse  $30\frac{1}{2}$  lines.

*Hab.*—Simoda, Japan.

This may be a variety of *P. hilpa*, Walker, but in the absence of direct comparison with the type it is impossible to decide.

FIDICINA Amyot et Serv.

F. ATRATA, Fab. Syst. Ent. 681, 15; Ent. Syst. iv. 24, 28. Donovan Ins.

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China, pl. 15, p. 31. Hong Kong, China. This species varies in the shape and direction of some of the nerves of the hemelytra, and in the coloring, particularly of the wings, but a comparison of the genital organs, &c., will satisfy any one of the identity of the species.

CICADA (Linn.) Amyot et Serv.

C. PELLOSOMA.—Pale ochreous or tawny; head with the eyes as broad as the thorax, dusky piceous above, with an ochreous band upon the anterior margin not quite reaching the eyes, a spot of the same color behind the stemmata, where there is an interrupted, longitudinal, impressed line; clypeus bounded posteriorly by a transverse sulcus, each side with an arcuated impression, and the anterior middle obsolete, longitudinally impressed, foveolated each side above the antennæ; face dusky, clothed with golden pubescence, the sides and middle of the front, and base of the rostrum honey-yellow; rostrum reaching to the middle coxæ, pitchy towards the tip, tip blackish; stemmata red; antennæ honey-yellow, tinged with piceous at base: prothorax a little broader posteriorly, subquadrate, the lateral margins moderately dilated and recurved, anteriorly obliquely rounded, posteriorly a little roundly emarginated, fuscous, with a middle, longitudinal line and the posterior and lateral margins yellow; mesothorax fuscous upon the middle to the base, W-shaped lines yellow: opercles subreniform, rounded posteriorly, about one-third the length of the abdomen, abdomen longer than broad, sublanceolate: beneath pale piceous; basal tooth of the anterior femora cylindrical, very oblique, long, acute, two smaller, straighter ones near the tip.

First transverse nerve straight, second oblique, forming an angle of about  $45^\circ$ , third almost straight forming a right angle, fourth curved inwardly, hardly oblique, fifth curved outwardly.

Length to tip of abdomen  $6\frac{1}{4}$  lines. Alar expanse 15 lines.

Hab.—Hong Kong, China.

The front is traversed by about seven transverse ridges, and the longitudinal sulcus is about two-thirds the length of the front; the female is paler than the male, and has the dorsal, thoracic spot replaced by four deltoid ones, the exterior ones of which are much larger than the others.

MOGANNIA Amyot et Serv.

1. *M. illustrata*, Amyot et Serv. Hemipt. 467, 1. Hong Kong, China.

2. *M. indicans*, Walker, Brit. Mus. Cat. Homopt. p. 249, 3. Hong Kong, China.

3. *M. histrionica*.—Piceo-rufous: densely covered with short pile; head ochraceo-fulvous, rostrum and each side of the epistoma tinged with piceous; face hairy, stemmata red: prothorax fulvous, more brightly so upon the posterior lobe, each side of the disk with a large rufo-piceous spot; mesothorax tinged with ferrugineo-piceous, excepting the sides; metathorax fulvous, barely emarginated posteriorly; abdomen piceo-rufous, the segments each side upon the incisures, tinged with fulvous, the apical segment with an erect, subcylindrical tooth superiorly, each side of which is a deep colored spot, beneath fulvous: wings subhyaline, the anteriors with a fuscous spot reaching beyond the middle, convex upon its exterior margin and only reaching the basal areole interiorly, the veins, base, costal margin and a transverse band near the apex of the spot, pale yellow, necks of the wings not reddish: pectus blackish-piceous; legs bluish-black, pubescent. Female.

Length  $6\frac{1}{2}$  lines. Alar expanse 15 lines.

The male is paler in coloring, especially upon the thorax, and the transverse yellow band of the fore wings is more spread upon the middle surface and margins of the veins; also less hairy; the opercles are transverse, reniform, fuliginous.

Hab.—Hong Kong, China.

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## HUECHYS Amyot et Serv.

H. SANGUINEA, De Geer, Mem. Ins. iii. 221, pl. 33; fig. 17. Hong Kong.

## CENTROTUS Fab.

Fragments of a species belonging to this genus, perhaps *C. taurus*, Fab., were contained in the lot from Hong Kong, but they were too incomplete to distinguish the species with certainty.

## CERCOPIS Fab.

1. *C. heros*, Fab. Syst. Rhyn. 89, 3. Hong Kong, China.
2. *C. bimacula*, Walker, Brit. Mus. Cat. Homopt. 656, 25. Hong Kong, China.

Descriptions of four species of HEMIPTERA collected by the North-Western Boundary Survey.

BY P. R. UHLER.

## Suborder HETEROPTERA.

## CORIZUS Fieb.

*C. BOREALIS*.—Pale fuscous, clothed with whitish hair; head narrow, eyes but little prominent, basal joint of the antennæ with a black spot beneath, and pointed above with black, as are also the two following joints, apical joint thicker, about equal in length to the preceding joint, dusky; a black arcuated spot between the ocelli and eyes, and a spot of the same color upon the ocelli; rostrum yellow, with a black longitudinal line; thorax coarsely, confluent punctured, the pectus with a spot, and an arcuated line behind the eyes, black, anterior margin of the prothorax blackish, lateral margins slightly sinuated before the middle, scutellum coarsely punctured, dusky at base, a longitudinal line at the base and the lateral margins smooth, yellowish, the apex with a rounded concave impression; corium semitransparent, pale yellowish, with a few small dots upon the longitudinal nerves, and two geminate, confluent spots at the anastomosis, black; principal nervures of the wings black; tergum black, finely, closely punctured, the last segment yellow, with a longitudinal spindle-shaped black mark upon the middle, and three sub-sutural ones each side, penultimate segment with a subtriangular, yellow spot each side, the antepenultimate segment with an oblong, yellow spot upon the middle, connexivum with a subquadrate black spot upon each segment, which are also seen beneath; venter with two somewhat approximate, black points, each side of the middle, upon the three discoidal segments, basal middle of the last segment with an obscure black point; legs pointed with black, the points confluent upon the posterior femora, forming a black patch, apices of the tarsal joints and the nails black.

Length 8 millims. Humeral breadth  $2\frac{3}{4}$  millims.

A single female was collected by the expedition, east of Fort Colville. I have also examined specimens obtained by Mr. Kennicott, in Arctic America.

## CORIXA Geoff.

*C. VULNERATA*.—Blackish fuscous, upper surface uniformly rostrated; front convex, hardly prominent, mouth dusky, eyes triangular, reddish brown, face with very long golden yellow hairs, vertex with four longitudinal rows of large punctures, occiput lightly carinated, acutely produced in the middle; prothorax obtusely rounded posteriorly, yellow, with seven black lines, two of them forked, posterior ones a little curved; lines of the clavus yellow, basal

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ones entire, those behind the base interrupted at the inner suture, a few of the middle ones broken; lines of the corium rather direct, broken, subparallel, oblique line at the membrane yellow, membrane with very serpentine lines, radiating towards the interior margin, which they do not reach; marginal area yellowish white; wings milk white; tergum black, connexivum yellow, with black incisures; beneath yellowish white, venter dusky at base; legs yellowish white, tip of the basal tarsal joints of the middle feet, black, a broad black band upon the tarsi of the posterior feet, palæ cultriform, slightly arcuated at the tip, rather broad, hardly broader in the middle, ciliæ moderately long. Female

Length  $7\frac{1}{2}$  millims.

Two specimens were obtained near Chiloweyuck Depot, Washington Territory. The species is remarkable for having very fine scratched, transverse lines bounding some of the lines of the thorax.

#### Suborder *HOMOPTERA*.

#### *CICADA* Linn.

*C. AREOLATA*.—Black, with a slightly aeneous tinge; head sordid black, having a marginal subtriangular, orange spot above the antennæ, hypostoma very prominent, rounded, convex, the longitudinal sulcus dilated near its middle, at each end becoming less defined, the transverse elevated lines slender, distant, the intervals flat, shallow; face clothed with long white hairs; rostrum blackish, orange upon the middle; apical joint of the antennæ yellow; eyes very prominent, pedunculated; superior aspect of the prothorax transversely quadrate, the posterior angles but slightly produced, the lateral margins obtusely angulated in the middle, hardly emarginate before the posterior angles, the posterior margin truncated, orange; surface rugous, with a longitudinal, slightly impressed orange line upon the middle; mesothorax black, shining; elevated posterior margin of the metathorax, including the two posterior branches of the elevated X, orange; hemelytra broad, obtuse, dilated upon the costal margin to the tip of the first marginal areolet, costa and two posterior longitudinal veins at base, yellow, remainder of the veins piceous, veins of the wings yellow, piceous at tip, excepting the middle longitudinal one, which is piceous almost to the base; tergum black, shining, with scattered white hairs, last segment with a long slender tooth superiorly; venter sordid black, densely hairy; lateral pieces of the antepectus orange; legs orange, the anterior femora black beneath, armed with two long, rather straight, acute spines; the knees, a line upon the tibiæ above, the tarsi, and tips of all the nails piceous; two foliaceous, rather thick, elongate-oval appendages at the caudal extremity beneath the tooth, the superior one much shorter than the other, and lying applied against it. Female

The male has no tooth at the caudal extremity, but appendages like those of the female are present; the penis cover is sub-fusiform, carinated above, and with an interrupted groove exterior to the concave sulcus present upon each side of the middle; the last ventral segment is extremely elongated, sheath-like, hairy, rufopiceous; the drums and sonory apparatus are merely rudimental.

Length 21 millims. Alar expanse 50 millims.

Found east of Fort Colville in Washington Territory. This species is very remarkable from the abortive appearance of the drums, and it is highly probable that the species is without a note. In the specimens noticed and captured, no note was observed to be produced.

#### *PROCONIA* Amyot et Serv.

*P. CONFLUENS*.—Blackish, slender; face white, front rather prominent, convex, two maculose, irregular, longitudinal lines upon the middle, a dot at 1861.]

base and apex, a few small spots about the tip, and the transverse striæ blackish or piceous; labrum with a short black line; rostrum tinged with piceous at tip and near the base, antennæ yellow at base, piceous at tip, situated upon a dusky spot, upper surface of the head black, a white abrupt line at the vertex, two abrupt longitudinal ones upon the disk, an abrupt transverse one on the middle of the posterior margin, almost connected with the discal ones, and a few minute spots, whitish yellow, discal impression shallow; thorax nigro-piceous, or fuscous, with five maculose, irregular, yellowish stripes, the exterior ones curved inward anteriorly, anterior margin yellow, and behind and against it are many small yellow marks and dots; pectus yellowish white, with black spots, a large black spot upon the pleura, behind the eyes; hemelytra blackish fuscous, with numerous yellowish white short streaks and flecks, especially upon the suture of the clavus, costal margin and interior edge of the clavus yellowish-white, interior apical areole of the membrane fuliginous, with a fuscous nervule; wings dark fuliginous; scutellum black, with a short apical line, the exterior edge and two spots upon the disk, yellowish-white; abdomen black, with the incisures of the segments yellowish-white; legs yellowish white, with white spines to the posterior tibiæ, base and apex of the posterior femora, the apices of the tarsal joints minutely, and the nails, fuscous.

Length  $5\frac{1}{2}$  millims. Alar expanse 13 millims.

Collected in the North-Western part of Washington Territory.

It is much less robust than *P. costalis*, Fab., which it most resembles.

#### Rectification of the paper upon the HEMIPTERA of the North Pacific Expedition.

BY P. R. UHLER.

My paper in the Proceedings for 1860 is very full of errors, owing to my not having received the proof in time to correct it before its passage through the press. There are many typographical and orthographical errors which the reader can correct for himself; but the specific name was omitted from the description under *ORTHÆA*, which must be *ORTHÆA MACULIFERA*, page 228. In the introductory remarks, page 221, the expression:—"genera *Pentatoma* and *Coreus* of Fabricius;" should read:—"genera *Pentatoma* of Latreille, and *Coreus* of Fabricius.

The genus *ECORYSSES* not being distinct from *Callidea*, the species described on page 221, must be referred to it, and as the specific name will thus be pre-occupied, it may be called *C. distinguenda*. The species of *ACANTHOSOMA* is wrongly referred to *hamatogaster* Burm., and is an undescribed species:—It may be called:—

*ACANTHOSOMA VICINUM*.—Olivaceous-yellow, coarsely punctured with black; head densely, confluent punctured, central lobe as long as the lateral ones; rostrum pale luteous, piceous at tip, antennæ pubescent, luridly luteous, the last joint and the middle of the preceding one piceous, ocelli red; thorax very coarsely, confluent, deeply punctured, particularly in occasional impressions of the surface, punctures rather sparse upon the disk, but much finer and extremely dense upon the humeri, humeral angles very prominent, subacute, emarginated behind, black, bounded interiorly with reddish; lateral margins of the thorax slightly sinuated, broadly impunctured. Scutellum sparsely, but very coarsely punctured, the apex not margined with yellow: corium impunctured upon the disk, the remaining surface rather finely, and in spots confluent, punctured; membrane fuliginous, with some large white spots; wings tinged with fuliginous: tergum reddish-brown, the lateral margins yellow, with three quadrate black spots, behind which are two black points: pectus rather finely, confluent punctured with black: venter yellow, polished, with a few scattered black punctures each side, the last segment and append-

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ages pitchy, ventral spine slightly surpassing the posterior coxæ: less honey-yellow, tips of the tarsi piceous.

Length to tip of membrane 7 millim. Humeral breadth 4 millim.

*Hab.* Hong Kong, China.

The generic name *PACHYCEPHALUS*, page 225, is preoccupied and may be changed to *HYGIA*; the species will then be *HYGIA OPACA*.

The name *ANACANTHUS*, page 227, is also preoccupied; it may be changed to *ANACANTHOCORIS*.

### Descriptions of Nine New North American LIMNOBIACEÆ.

BY BARON R. OSTEN SACKEN.

Since the publication of my paper on the N. A. *Tipulidæ with short palpi* (in the Proceedings of the Academy for August, 1859,) my opportunities for collecting have been very limited, and in consequence of this, the number of new species discovered is not as large as I might have desired.

The following descriptions embrace five new species found by myself, two collected by Mr. Alex. Agassiz, in California, and two by Mr. Robt. Kennicott, in the northwestern parts of the possessions of the Hudson's Bay Company.

Several other new species in my collection I do not venture to describe, the number of specimens not being sufficient to establish the specific character. Among them, a *Dicranoptycha*, from California, deserves to be mentioned as a matter of geographical distribution.

I take occasion here to correct two errors which I discovered in the above mentioned paper.

First, That the measurement which I have used are *tenths of an inch*, and not *lines*. I called them lines, because the line used in Russia is equal to one-tenth of the Russian inch, which is the same as the inch used in England and America.

Second, That my *Limnophila pavonina* is the *Limnobia fuscipennis* Say. I had failed for a long time to identify this species from Say's description, but am positive now about this synonymy.

#### DICRANOMYIA Steph.

D. IMMÉMOR.—Silacea, thorace pleurisque vittis infuscatis, *alis immaculatis*, elongatis, *valde angustis*, areola discoidali aperta; long. 0.25—0.3.

Ochraceous, vertex infuscated, palpi and antennæ brownish, second joint of the latter stout; præscutum with three indistinct brown stripes; the intermediate darker towards the collare; pleuræ with a brown stripe extending from the base of the halteres, across the root of the wing towards the humeri; halteres pale, knob almost imperceptibly infuscated; tergum somewhat brownish; feet pale yellow, tip of tibiæ and the tarsi infuscated; wings very narrow, almost lanceolate, their basal, narrowed portion very long; anal angle small, hardly projecting; their color is subhyaline; stigma elongated, pale, its outline indistinct posteriorly; costal and subcostal veins yellow, the other veins brown; tip of the mediastinal vein a little beyond the origin of the petiole; stigmatal crossvein near the tip of the subcostal vein; radial area considerably longer than the cubital one; the latter longer than the subapical one; discoidal areolet wanting, the space usually occupied by it not being closed by a crossvein; this space is narrow and elongated; the fork, enclosing the second externomedial areolet is short and narrow; axillary vein somewhat undulated.

Numerous ♂ and ♀ specimens on a meadow near the Trenton Falls, N. Y., in September (nob.)

The general habitus of this species is different from the other *Dicranomyiæ*; its very narrow wings with their yellow costal and subcostal veins, forming a contrast with the brown color of the other veins, make it easily recognizable. The structure of its male forceps belongs to the same type with those of the other species of the group.

1861.]

*D. MARMORATA*.—Cinereo-fusca, thorace vittis tribus fuscis, alis cinereo nebulosis, stigmatè quadrangulari, fusco; long. 0.4.

Proboscis, palpi and antennæ brown; joints of the latter subglobular, verticils short; front and vertex cinereous, darker in the middle; thorax cinereous, with three brown stripes; abdomen brownish cinereous, posterior margins of the segments pale; halteres pale; feet yellowish, tips of femora, of the tibiæ and of the tarsi brown; wings subcinereous with some darker clouds and some hyaline bands and spots; a cloud at the origin of the petiole, another, round one, at the tip of the petiole; a crossvein also clouded; stigma obscure-cinereous, elongated, quadrangular; the hyaline spots are arranged in the following way: a small rounded one in the anal angle; a band running across the basal portion of the præ-, pobrachial and anal arææ and ending in the axillary near the posterior margin; a spot in the anal area near the tip of the axillary vein; a large irregular hyaline space in the central portion of the wing, enclosing the stigma and the two clouds of the petiole, and extending more or less towards the posterior margin, across the discal and the externomedial areolets; its outline is very indefinite, and it is interrupted by clouded marks along the veins; a small hyaline mark at the tip of the wing, in the cubital vein. The tip of the mediastinal vein almost corresponds to the origin of the petiole; the mediastinal crossvein is a short distance before its tip; the discal areolet is present (closed) and the great crossvein corresponds to its base.

California, two ♂ specimens. (Mr. A. Agassiz.) This species is related to *D. humidicola*, O. S.

#### LIMNOBIA nob.

*L. CALIFORNICA*.—Thorax vittis quatuor; alæ fuscæ, pallide fenestratæ, margine anteriore maculis quatuor fuscis; long. 0.7—0.8.

Front and vertex brown; underside of the head and sides of the occiput yellow; proboscis, palpi and antennæ brown; two basal joints of the latter yellow. Thorax yellowish, mixed with brown; præscutum with four brown stripes; the intermediate ones narrow, parallel; at their anterior end, they coalesce with the brown margin to the præscutum, which is broadest at the humeri; lateral stripes abbreviated anteriorly and extending over the scutum posteriorly; scutellum, metathorax and pleuræ more or less tinged with brownish; base and tip of halteres pale, the intermediate portion infuscated; femora brownish; a yellow ring before the tip, which is black; tibiæ ferruginous-brownish, brown at tip; tarsi ferruginous-brownish at the base, the remainder brown. Wings with a brownish tinge; four large brown spots along the anterior margin; the first at the basis of the præbrachial area; the second at the origin of the petiole, somewhat trapezoidal; both do not cross the subcostal vein, and do not therefore reach the anterior margin; the second is limited posteriorly by the præbrachial vein; the third spot is double, consisting of an oblique spot which begins at the margin, just beyond the tip of the mediastinal vein, and coalesces with a round spot at the tip of the petiole (origin of the fork); the fourth spot is at the tip of the subcostal vein; it is semi-oval and is enclosed between the costa and the radial vein; there are several subhyaline spots on the surface of the wing; a large angular one, beginning about the middle of the anal area and reaching the posterior margin at the tip of the axillary vein; smaller ones in the anal angle of the wing, at the tip of the anal vein; in the pobrachial area (near the great crossvein); in the discal areolet; at the tip of the wing, and on both sides of the fourth brown spot. A subhyaline longitudinal streak crosses the second brown spot in the præbrachial area, and the round spot at the tip of the petiole is encircled in pale. The mediastinal veinlet is almost in one line with the tip of the mediastinal vein.

California (Mr. Alex. Agassiz.) Single male.

This species belongs to the group of *L. cinctipes*, *solitaria* and *immatura*, and is most allied to the latter. Still it will be readily distinguished by its greater size, the coloring of the feet and the wings, etc.

*L. PARIETINA*.—Brunneo-flavescens; thorace vittis tribus fuscis, media capillari; alæ nebulis, strigis et maculis pallide fuscis; stigmata pallido, longo; *venula stigmatali a venarum mediastinalis et subcostalis terminibus aequè distans*; long. 0.6—0.65.

Head, proboscis and palpi dark brown; antennæ pale, joints of the flagellum brown at the basis. Præscutum yellow, with three brown stripes; the intermediate is divided by a longitudinal, pale, sometimes hardly apparent line; the lateral ones are abbreviated before and extend over the scutum behind; scutellum and metathorax brownish; pleuræ brownish, mixed with yellow; halteres infuscated, whitish at tip; feet yellowish brown, a pale ring before the tip of femora; the latter pale; tarsi brown. Abdomen brownish; posterior margin of segments and a longitudinal stripe along the middle of the back, pale. Wings with clouds on all crossveins and with pale brown irregular spots in almost all the aræ; *in three or four of the apical areolets these spots assume the shape of an inverted V*. The stigma is very long, pale; the stigmatal crossvein is in the middle of the distance between the tips of the mediastinal and the subcostal vein; the mediastinal crossvein is close at the tip of the mediastinal vein.

The position of the stigmatal crossvein, and the very oblong stigma distinguish this species from all the others of the group. Its antennæ, especially in the living specimens, seems to be 15-jointed, the linear part of the 14th joint being unusually long; still, a careful examination convinced me that there was no articulation to separate this 15th joint.

Trenton Falls, on fences, in September, numerous ♂ and ♀ specimens, (nob).

*L. HUDSONICA*.—Thorax vittis quatuor, alæ fusco-maculatæ et nebulosæ; maculæ in margine anteriore obscure brunneæ, subopacæ; earum prima duplex; long. 0.5.

Head cinereous above, yellowish-ferruginous below; proboscis and palpi brown; antennæ brown; basal joints yellowish-ferruginous; præscutum with four brown stripes; intermediate ones separated by a yellowish line which is gradually widened anteriorly; halteres with a brown knob; feet (?); wings with brown spots and clouds; four deep brown spots along the anterior margin; the first is double, consisting of two spots, one at the base of the præbrachial area, the other immediately beyond it, connected together by the expansion of the first of them in the pobrachial area; the second spot, at the origin of the petiole, is trapezoidal, the oblique sides being slightly excised; the third, at the tip of the petiole, is oblique and double; the fourth, at the tip of the subcostal vein is rounded; the intervals between the three first of these spots are cloudless, whitish; the clouds on the remaining portion of the wing are exactly like those of *L. immatura*, only their color is more intense; an undulated one runs across the apical portion of the wing, and there are several along the posterior margin. The fork formed by the tip of the mediastinal vein with its crossvein, is like that of *L. solitaria*, that is, the upper branch is longer and oblique, the lower one being short and perpendicular.

Single female from the Slave Lake (Huds. Bay Terr.) by Mr. R. Kennicott.

The resemblance between this species and *L. immatura* is very striking; still they can be distinguished by some very reliable characters. The desire to prevent their confusion induced me to describe this new species, although I have but one imperfect specimen. The principal characters distinguishing them are—1st, the spot at the base of the præbrachial area is simple in *L. immatura*, whereas it is composed of two successive spots, connected as described above, in the other species; 2d, the structure of the mediastinal fork, and perhaps, 3d, the brown knob of the halteres in *L. hudsonica*, whereas in *L. immatura* the upper portion of this knob is pale. Besides, the spots of *L. hudsonica* are of a much more intense brown, contrasting with the pale space between them.

We have now five closely allied species within the genus *Limnobia* proper.

As they may be somewhat difficult to identify, the following tabular arrangement will clearly point out their differences.

Upper branch of the fork (formed by the tip of the mediastinal vein, with the mediastinal crossvein), longer, somewhat arcuated; the lower one short, perpendicular.

Two dark brown spots in the basal portion of the præbrachial area, connected together by the expansion of the first of them within the pabrachial area; tips of femora (?) *hudsonica*, O. S.

Brown spot at the basis of the præ- and pabrachial areas pale and not distinct; a series of more or less numerous dots along the disc of the former area. Tips of femora brown, a pale ring before them. *solitaria*, O. S.

Branches of the fork of about equal length.

Surface of the wings brownish, with some pale marks (besides the usual four large brown spots along the anterior margin); tips of femora brown, with a pale ring before them. *californica*, O. S.

Tips of femora yellow, but with a brown ring close before them; wings with brown clouds and spots; an ocellated spot at the posterior end of the stigma. *cinclipes*, Say.

Lower branch of the fork longer, oblique, the upper one being perpendicular; wings marked like in *L. cinclipes*, but the brown spot at the posterior end of the stigma is not ocellated; tips of femora yellow, but with a brown ring close before them. *immatura*, O. S.

#### TRIMICRA nob.

Proboscis and palpi short. Antennæ of moderate length, 16-jointed; joints of the flagellum, especially the basal ones, subcylindrical, slightly incrassated at the base, with moderate verticils; three apical joints of the ♂ very abruptly smaller than the preceding ones, subglobular. Feet long, hairy, moderately stout; without spurs at the tip of the tibiæ. Ungues very small, smooth, inserted under a projection of the last tarsal joint. Pulvilli small, but distinct. Wings somewhat elongated, rather narrow; veins arranged more or less like *Limnophila*, or *Cladura*, but no petiolate areolet; petiole long, not arcuated at its origin, which is removed towards the basis of the wing to a point situated some distance before the middle of the wing; mediastinal crossvein far removed from the tip of the mediastinal vein, being more than twice nearer to the origin of the petiole than to that tip. Genitals of the ♂ apparently like *Limnophila* (I neglected to make a drawing of them from the living insect.)

The position of this genus in the group of the *Tipulæ eriopteraformes* is evident. It is easily distinguished by the three small-sized terminal joints of its ♂ antennæ. Still, as this character may be less distinctly seen in dry specimens, the position of its mediastinal veinlet, the absence of the petiolate areolet, the form of the petiole, which is not, or is almost imperceptibly, arcuated at its origin, and finally, the form of the male genital organs, will help to distinguish it from *Cladura*. It is allied to *Erioptera* on account of the situation of the mediastinal crossvein, but distinguished from it, besides the structure of the antennæ, by its glabrous wings only very slightly pubescent along the veins.

T. ANOMALA.—Fusco-cinerea, antennis nigris, thorace vittis tribus fuscis, femoribus apice infuscatis; alis immaculatis, modice brunnescentibus; long. 0.3—0.35.

Brownish cinereous; front with a brown line in the middle; antennæ and palpi blackish-brown; præscutum infuscated in the middle, with three dark brown lines, the intermediate one especially distinct; the lateral ones extended over the scutum; scutellum paler; metathorax and pleuræ somewhat hoary; halteres pale, a little infuscated at the basis of the knob; feet hairy, brownish yellow, tip of femora broadly, tip of tibiæ slightly infuscated; tarsi brown, paler at base. Tergum brown, hairy, sides and forceps of the ♂ paler. Wings

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immaculate, slightly tinged with brownish; stigmatal crossveins and the other central crossveins with a slight brown nebula; veins minutely pubescent towards the tip; the stigmatal crossvein starts from the upper branch of the radial vein, immediately beyond the origin of the second radial area; the latter is a little shorter than the cubital area; the subapical area almost of the same length with the preceding one; discoidal areolet narrowed anteriorly, like a truncated triangle; the great crossvein a little anterior to the discoidal areolet.

Washington, D. C., autumn, 1860.

Compared a ♂ and a ♀ specimen; the discoidal areolet of the right wing of the ♂ is abnormally formed, its second lower discal crossvein being removed towards the basis of the areolet, in such a way that the first and second externomedial veins form a petiolate areolet, and the discoidal areolet is very much shortened.

#### CLADURA O. S.

*C. INDIVISA*.—Flavo-ferruginea; pleuræ punctis, abdomen fasciis brunneis; alæ subflavescentes; *area cubitali integra* (venula transversa non instructa); long. 0.28—0.3.

Similar in all respects to *C. flavoferruginea*, only the transverse vein in the cubital area is wanting; crossveins and origin of petiole but indistinctly clouded; the size is variable, but generally smaller than in the other species.

When I described *C. flavoferruginea*, I had several specimens of this new species before me, all from Massachusetts. Although the absence of the crossvein in all these specimens was a very striking character; I did not choose at that time, without further proof, to consider them as a different species. Since then I caught numerous specimens at the Trenton Falls, in September, 1860, all partaking of the same character, which removes all doubt as to their specific diversity. Some of these specimens, probably recently excluded, were very pale and altogether without spots.

Mass. (Mr. Scudder); Trenton Falls (nob.)

#### AMALOPIS Halid.

*A. VERNALIS*.—Fusco-cinerea, thorace vittis tribus fuscis, media cuneiformi, capillari; alæ maculis 5 vel 6 in margine anteriore; long. 0.3—0.4.

Head brownish-cinereous, front infuscated in the middle, palpi at the tip; antennæ 16-jointed, not much longer than the head; basal joint yellowish, flagellum brown, verticils very short. Præscutum yellowish-cinereous with three stripes; the intermediate one broad, cuneiform, with a pale line in the middle (capillary); lateral ones abbreviated anteriorly; scutum infuscated in the middle; scutellum, metathorax and pleuræ cinereous; the latter somewhat hoary; halteres pale yellowish; feet brownish, base of femora pale. Abdomen brown, posterior margin of the segments pale; ♀ ovipositor ferruginous. Wings somewhat infuscated with five brown spots along the anterior margin; the first at the mediastinal crossvein, the second at the origin of the petiole, the third, fourth and fifth at the tip of the mediastinal, subcostal and radial veins; a sixth spot is at the tip of the petiole; besides these spots, all the crossveins and tips of the longitudinal veins are more or less clouded; the male especially has some indistinct clouds on the apical portion of the wing, along the veins; petiolate areolet extant.

Washington, D. C., two specimens (♂ ♀) in April (nob.)

This species shares all the characters of *Amalopis*; the palpi, however, seem to be somewhat shorter than in the other species of this genus. The structure of the discoidal areolet is very peculiar; the obliquity of the second lower discal crossvein, common to all species of the genus, is carried so far here, that this crossvein assumes an altogether longitudinal direction, and thus ceases to be a crossvein, becoming a mere prolongation of the second externomedial vein. In consequence of this, the following changes take place in the neuriation of that part of the wing: the discal areolet is narrow, parallel, and *has but a single* 1861.]

*lower crossvein*; the third externomedial areolet is unusually long, its basis being on the same line with the bases of the discal and of the fourth externomedial areolets; the third externomedial vein, instead of issuing from the discal areolet, runs parallel to it and becomes a mere prolongation of the præbrachial vein. Other peculiarities of the neururation are, that the *cubital vein forks* and not the radial one (at least such is the case in both of my specimens), that the stigmatal crossvein is close at the tip of the subcostal vein, and that there is a stump of a vein near the origin of the petiole. The ♂ genital organs seem to be analogous to those of *Pedicia*. The spurs at the tip of the tibiæ of this species are very small, almost imperceptible.

A. HYPERBOREA.—*Fusca*, alis fusco maculatis, *area pobrachiali media venula transversali instructa*; long. 0.45.

Very like the preceding, but easily distinguished by the coloring of the wings, *by the presence of a supplementary crossvein* about the middle of the pobrachial area, and by the oblique direction of the second lower discal crossvein (similar in this respect to all the other species of *Amalopsis*).

The only specimen which I possess is spoiled by mould, so that my description will necessarily be incomplete.

Body brownish, antennæ brown, feet brownish, base of femora paler, tip of tarsi dark brown. Wings with a slight brownish yellow tinge, and with brown spots at the tips of nearly all the veins, as well as at their anastomoses. There are seven such spots along the anterior margin (one at the humeral crossvein, another a little beyond it, a third at the mediastinal crossvein, a large spot at the origin of the petiole, extending to the anterior margin, the following three at the tips of the mediastinal-subcostal and radial veins); similar, but smaller spots at the tips of the veins of the posterior margin (beginning with the first externomedial); other spots at the base of the pobrachial area, in the middle of the subaxillary area (at the posterior margin), at the basis of the petiolate areolet, of the area formed by the fork of the cubital vein, and a square cloud in the middle of that area; crossveins also clouded.

The petiolate areolet is present; the stigmatal crossvein is near the tip of the subcostal vein, and there is a stump of a vein near the origin of the petiole.

Labrador; single ♂ specimen.

### Contributions to the Ophiology of Lower California, Mexico and Central America.

BY E. D. COPE.

#### VIPERIDÆ.

*Caudisona durissa* Laur. Cope, Smithsonian Contributions, v. xii. Researches on the venom of the Rattlesnake, by S. W. Mitchell, M. D., p. 120.

A male specimen of this serpent (No. 4945) has been sent by Capt. J. M. Dow, from La Union, San Salvador, to the Smithsonian Institution (No. 4945). It is identical with specimens from Surinam in Mus. Academy, exhibiting similar muzzle plates, head and neck stripes, and the isolated black dorsal rhombs upon a yellow ground, with yellow centres. The crepitacula of this species and the *C. terrifica* are much shorter and more compressed than in *C. atrox* and *C. horrida*.

*Caudisona atrox sonoraensis* Kenn. Proc. Acad. Nat. Sci. Phila. 1861, p.

Specimens sent from Cape St. Lucas, Lower California, to the Smithsonian Inst. and Phila. Academy, by Mr. John Xantus, are more delicately tinted than Sonora specimens. The dorsal rhombs are more perfect, their yellow borders brighter, and their centres paler and similar in color to the lateral interspaces. The scales but little roughened.

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*Caudisona enyo* Cope.

Head depressed, covered with small keeled scales. Superciliaries large, prominent, preceded by a small marginal plate; muzzle covered above with nearly equal polygonal scales, slightly or not keeled. Rostral plate low, in form a nearly equilateral triangle: nasals two, the anterior in contact with the rostral: numerous small scales anterior to the fovea lachrymalis. Thirteen or fourteen superior labials, the posterior small; fourteen and fifteen inferior, the second, third and fourth in contact with the genaeal. Two rows of smooth scales, and the infra orbital circle, separate the labials from the orbit; the scales of the former continue smooth upon the temporal region, and are larger than the labials. Scales of the body rounded, short upon the sides, especially those of the first three rows which, near the middle of the body, are not at all, or scarcely, keeled. Total number of rows 23, the median very strongly keeled, none rugose striate as in *atrox*. Crepitaculum moderate, its segments diminishing in breadth towards its extremity. Gastrostege 166. Urosteges 23 single, 3 pair double. Total length (including crepitaculum) 29 in. 9 lin. Tail 4 in. 3 lin.

General color above, light greyish brown, shaded with yellow; vertex rufous, marked with a pair of small brown spots. A light band, bordered with dark crosses each superciliary plate; from the inner border of the same plate commences a chestnut brown band, which diverges from its fellow on the posterior part of the head, where it is either interrupted or continuous with a broader one which nearly joins that of the opposite side on the neck: here they are either interrupted, or continuing, unite on the neck, and form the first spot. A brown band extends from the eye to the canthus oris, involving the last labial plate, and is continued beyond, forming a spot on each side the throat. A series of about thirty-three spots ornaments the middle line of the back; posteriorly they are of a wood brown color; the others chestnut brown bordered with black. Anteriorly the spots are longer than broad, emarginate anteriorly and posteriorly; opposite to each is a black spot upon scales of the first, second, and third rows. The dorsal spots become broader, resembling transverse rhombs, with light borders outside the black; the lateral angles become confluent with the lateral black spots, forming vertical black bands on the sides. They finally assume the form of transverse brown bands. The tail is crossed by five of these, upon a brown ground. Beneath yellow; tips of many of the gastrostege blackish. Inhabits Lower California, whence specimens have been sent to the Philadelphia Academy and Smithsonian Institute, by Mr. John Xantus. Type 4663. Xant. Coll.

This species bears considerable resemblance to *C. mollisus* in its style of coloration, and like it, is a beautiful animal. The latter species is scutellated upon the muzzle, as in *C. durissa*: the rows of scales are more numerous than in the *enyo*, and it is without the head stripes.

*Caudisona mitchellii*, Cope.

Head depressed, covered with small irregular scales, posteriorly keeled, anteriorly, and upon the obtuse muzzle, rugged, free at the lateral or hinder edges. Superciliaries prominent, striate rugose. One loreal; nostril large, prenasal small, higher than long, separated from the rostral and superior labials by small scales. Rostral low, an equilateral triangle. Sixteen superior labials, the last large, three rows between them and the orbit; temporals, large, smooth. Superior labials sixteen. Scales elongate, striate rugose, in 25 rows, all strongly keeled except the first. Crepitaculum well developed of the *C. atrox* type, i. e. strongly compressed, having the terminal complete segments as broad as the basal. Gastrostege 198; urosteges 26. Total length (excl. crepitaculum) 44 in., tail 3 in. 6 l.

The color above and below is greyish yellow. The upper surface of the head is shaded, that of the body coarsely and densely punctulated with brown.

1861.]

The regular aggregation and deepness of these punctations, form a series of about forty-two dorsal spots. These are transverse, with produced lateral angles, extending across twelve rows of scales from angle to angle, separated from the adjacent ones by a bright band of ground color one and a half scales wide. On the posterior fourth of the total length, they form brown cross bands: five upon the tail are black on a very light ground as in *C. atrox*. Anteriorly there is an ill-defined series of spots which are opposite those of the dorsal line. A yellow band extends from the nasal plates anterior to the eye, involving from the ninth to the last superior labial. Superior to this is a brown band extending from the eye and ceasing on a line with the angle of the mouth. Some indistinct brown marks on the top of the head are arranged as follows: one on the inner border of each superciliary; three posterior to these, the median short and broad; four further posterior, the median pair longer, diverging, reaching the neck. Cape St. Lucas, Lower California; one specimen (5291 $\frac{1}{2}$  Sm. No.) in Mus. Smithsonian from Mr. John Xantus.

This curious rattlesnake is related to *C. tigris*, *C. cerastes*, and *C. lucifer*. In common with the first two and *C. enyo*, *lepidus* and *molossus*, it exhibits a low rostral plate. The plates of the superior parts of the muzzle resemble only those of (among the above mentioned species) *cerastes* and *enyo*, being small, irregular and rough, without even the marginal series seen in *lucifer*, *atrox*, *horrida*, etc. In shade of coloration it is not unlike *tigris*, being well adapted for concealment upon the sandy soil of the Californian deserts: the distribution and form of the spots are like those of *lucifer*. The separation of the prenasal from the rostral plate is peculiar to the species. It is named in honor of Dr. S. W. Mitchell, the author of the interesting "Researches upon the Venom of the Rattlesnake."

In the catalogue of rattlesnakes in the Smithsonian contributions, previously cited, thirteen species of the genus *Caudisona* were referred to, as distinguishably described. Two have been since added to this list, making, with those of the present memoir, the whole number seventeen. Of these, three inhabit South America, six Mexico, two Lower California, and eleven the United States. Two of the eleven are found east of the Mississippi River; one west of the Rocky Mountains; the intermediate region is inhabited by ten species,—*lucifer* entering from the west, and *horrida* from the east. Of these, the most northern, and widely diffused is *Lecontei*; it extends from southern Nebraska to Utah; in the great basin of the latter country a curious variety of it is found. *C. atrox* alone inhabits the greater part of Texas; in the extreme west of that State, and probably in Chihuahua, *C. lepidus* occurs. The greatest intensity of species is in south western New Mexico and Apacheria (or Arizona), where are found *tigris*, *cerastes*, *scutulatus*, *atrox sonoraensis*, *molossus*, and perhaps *lucifer*.

Structurally, the South American species and *molossus* form a group characterized by the six regular plates of the muzzle, and the small rattle. The single nasal and smooth head plates isolate the *lepidus*. The superciliary hornlike processes, and the rostral plate, broader than high, separate the *cerastes*. The remaining species form the largest group, where there are two nasals, one or more pairs of marginal plates between the superciliary and rostral, separated on the median line by smoother or rougher, small irregular scales; no superciliary processes. *C. mitchellii* must be distinguished from these by its absence of marginal plates, and presence of scales on the lateral borders of the rostral. All the species have Professor Reinhardt's scale pores in pairs; they are very difficult to observe in some of the species—as *cerastes* and *mitchellii*. In *durissa*, a single pore is frequently met with.

*Bothriechis mexicanus* Cope. *Atropos Mexicanus*, Dum. Bibr. vii. p. 1521. Specimens in Mus. Smithsonian and Academy from Dr. C. Sartorius from

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Mirador, Vera Cruz. As suggested in these Proceedings for 1859, p. 339, this species does not belong to the *Atropos* of Wagler.

There is a superciliary plate, much encroached upon by the scales of the vertex. The description in the *Erpetologie Generale* is applicable to our specimens, but the coloration of the plate is slightly incorrect. The dark brown dorsal rhombs are occasionally isolated.

*Bothriechis brachystoma* Cope. *Teleuraspis Castelnau* et var. *brachystoma* Cope, Pr. A. N. S. 1859, p. 339. Ibid. 1860, p. 72.

This species is not *Bothrops Castelnau* of the *Erpetologie Generale*, as we had been led to believe, through the insufficiency of the brief description in that work. An examination of Prof. Jan's synopsis in *Rev. et Mag. de Zool.* 1859, p. 155, shows it to be similar to the *B. numifer*, but as I have failed to find any description of the latter, I have retained the name given as above.

Scales of the vertex, front, and temporal regions, keeled. Canthus rostralis prominent, acute, bordered by three scales on each side. Muzzle recurved, rostral plate high. Superior labials normally ten, rarely nine or eight. Second separated by a plate from postnasal, and with the third by granulations from the fossette. Fourth and fifth largest, separated by one row of scales from subocular granulations. Twelve to fourteen inferior labials. Dorsal scales in twenty-five rows, all keeled but the first. Tail short, quite slender, terminated by a small corneous appendage, which is compressed, grooved upon each side, each moiety inflated, the inferior most produced. Total length 13 in. 9 lin., tail 1 in. 5 l.

Ground color above, gray or fulvous brown, lightest medially. On each side of the median line a series of from sixteen to twenty-one parallelogrammic brown spots, which are opposite or alternate with those of the opposite side, and frequently divide into double triangles anteriorly. Two spots on the third, fourth and fifth rows opposite each dorsal spot. Gastrosteges and throat clouded and punctulated with brown. Head above and jaws dark brown; a light band back of the eye. In the type of var. *brachystoma*, the superior labials are abnormally nine, the upper and lower labials and genual region brownish black; on the inferior labials three light spots, the two anterior continuous from the eye, the posterior prolonged on the neck, forming a light band. A specimen in the Mus. Smithsonian from La Union, Guatemala, from Capt. Jno. M. Dow, is similar to the last, except in having ten labials, four scales bordering the canthus rostralis on each side, twenty-eight pairs of spots, and gastrosteges broadly bordered with brown. Sm. No. 4950.

*Bothrops atrox* Wagler.

Specimens in Mus. Smithsonian from Greytown, Central America, Dr. Caldwell, donor, and from Mirador, Vera Cruz, from Dr. C. Sartorius. The latter is the most northern locality yet recorded for this widely distributed species. The specimen is half grown, of a mouse color, with about twenty-one pairs of brown triangular spots, sometimes alternate, sometimes confluent on the median line. Sides of the head and throat yellow. Scale-pores not discoverable.

#### NAJIDÆ.

*Elaps elegans* Jan.

A beautiful specimen of this species from Mirador, Dr. Sartorius' Coll., in Mus. Smithsonian, exactly as figured and described by Prof. Jan. Some naturalists appear recently to have become convinced of the specific identity of the forms of *Elaps* from *corallinus* to *fulvus*. We are of opinion that a similar relation will be found to exist between *corallinus* and *lem-* 1861.]

niscatus, through isozonus, et. al., and that a belief in the identity of the lemniscatus with the fulvus will be equally "inevitable." In the case of the forms of the genus *Thamnophis*, a similar conclusion has been reached, though not consistently carried out, on account of a misapprehension relative to the structure of the preanal plate of the *T. sauritus*. The admission of the identity of *T. sirtalis* with *T. haydeni*, renders the acceptance of *faireyi* and *sauritus* as distinct from the former, impossible.

Similar methods of reasoning would necessitate the union of many of the species of *Simotes*, *Tropidonotus*, *Lampropeltis*, *Caudisona*, and no doubt at some future day of those comprised in the sections of "protean" genera generally. But if we are to be taught by nature, we will not assume a knowledge of her system which we do not possess; and laying down as our premises what are scarcely yet our conclusions, form associations which a fresh accession of information must compel us to alter. Let us simply record what we find to exist, and while the grand plan becomes more and more evident, will await patiently the period, perhaps not far distant, when we shall fully comprehend the details of our branch of the great Cosmos, and be able to present it in its completeness to the contemplation of man.

*Elaps euryxanthus* Kenn., Proc. Acad. Nat. Sci. Phil. 1860, 337.—Mr. Kennicott has not given us the locality whence the specimens described by him were obtained. We believe that one of them was from the region of the Gila. A specimen of the same serpent has been sent to the Mus. Compar. Zoology, Cambridge, from Guaymas, Sonora.

#### COLUBRIDÆ.

##### *Himantodes leucomelas* Cope.

Slender, but less elongated than *H. cenchoa*. Head very distinct, elliptic. Rostral plate triangular, subinferior. Vertical, with nearly parallel lateral borders, which are longer than the anterior. Length of occipitals, greater than their breadth, and than the vertical; marginal temporals six. Nasals small; loreal higher than long; two preoculars, superior not in contact with vertical; two postoculars, bounded posteriorly by two temporals. Eight superior labials; eye resting upon the fourth and fifth. Superior labials ten, sixth largest. Seventeen rows of scales, those of the median dorsal broader than long. Length of tail contained three and a half times in the total length. Ground color above and below white tinged with ashy. This is crossed above by twenty-nine black elliptic spots, which cover the tips of the gastrosteges on each side. About eighteen spots on the tail. Beneath, punctulated with black, forming posteriorly a median band. A pair of elongate black spots extend from the posterior half of the superciliary plates, across part of the vertical, and the whole length of the occipitals, to a short distance posterior to them. They are separated by a narrow band of ground color. There exists a black spot on the anterior part of the vertical, and a band of the same across the postfrontals.

From Mirador, Vera Cruz. Dr. C. Sartorius. Mus. Smithsonian.

*Himantodes gemmistratus* Cope. *Himantodes cenchoa* Cope, Proc. A. N. S. Phil., 1860, p. 264.

Similar in proportions to *H. cenchoa*. Head short, thick, temporal region swollen. Lateral borders of vertical plate slightly convergent, equal in length to the anterior. The special peculiarities which distinguish it from *cenchoa* are as follows. The scales of the median dorsal series are diamond-shaped, longer than broad, not transverse. But one temporal in contact with the postoculars. Sixth inferior labial largest, not the fifth. In coloration it is quite similar; the spots upon the body number about forty-two, but they are peculiar in being connected by a median dorsal vitta. The belly is punctulated laterally, and is without the median vitta of the *cenchoa*.

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The brown of the upper surface of the head is pale, and is varied by a few irregular darker spots. Total length 30 in., tail 9 in. One specimen in Mns. Acad. Nat. Sci. from Capt. Jno. Dow. Habitat San Salvador, Centr. America.

This is a plainly colored species, resembling the *cenchoa* more than the *lencomelas*. In a specimen which we regard as belonging to the former from Trinidad, sent by Mr. A. H. Ruse to the Mns. Smithsonian, the spots are large, forty-three in number on the body, bordered with darker. The lateral borders of vertical plate are very convergent, almost continuous with the latero-posterior. The fifth inferior labial is largest. The coloration of the vertex, as represented imperfectly by Seba, consists of a chevron-shaped brown band between the orbits, the angle directed posteriorly; a light Y-shaped figure enclosed by brown bands on the occiput and nape; a shade of brown upon the vertical plate. The punctulations of the belly are most dense medially, forming a band.

In the three species of Himantodes, the postabdominal plate is divided, and the dentition dipsadine. In the two species here described, the scale pores are single; in *H. cenchoa* I cannot discover them.

*Trimorphodon lyrophanes* Cope. *Lycodon lyrophanes* Cope, Proc. Acad. Nat. Sci. 1860, p. 343.

Upon the species described as above, as congeneric with the *Siphlophis scolopax*,\* we now establish the genus *Trimorphodon*, diagnosing it as follows: Body elongate, compressed; head distinct, depressed. Posterior superior maxillary tooth separate, grooved; median teeth small; anterior elongate, spaced. Anterior mandibular longer than posterior. Pupil vertical. Nasal plates two, loreals two, pre- and postoculars two or more. Scales of the median dorsal line small. Anal and subcaudal scutella divided. Scale pores double.

In *Siphlophis* the anal plate is entire, there is one preocular, and one loreal plate. The median dorsal series of scales is larger. In *Dipsadomorphus* the anterior teeth are not stated to be longer, the loreal and preocular plates are single, the median dorsal row of scales is larger. The anal is entire, and, if it be a valid character, the scale pores are single.

The genus is nearly allied to *Tripanurgus* and *Siphlophis*. The physiognomy of the species is repulsive. The present species has only as yet been certainly ascertained to inhabit Lower California; the identity of specimens from Arizona I regard as not ascertained. Mus. Acad. Nat. Sci. and Smithsonian.

*Trimorphodon biscutatus* Cope. *Dipsas biscutata*, D. & B. vii. 1153. *Dipsadomorphus biscutatus*, Gthr. Cat. Colubr. Brit. Mus. 176.

This species has the scales in twenty-five rows (23 D. & B.) the preceding, twenty-one. Here the preocular is in contact with the vertical; in the former not. This has the head bands in chevrons, the *lyrophanes*, lyre-shaped; the dorsal spots are also much more emarginate anteriorly, laterally, and posteriorly. The *biscutatus* is much the larger animal of the two. One specimen (5569) in the Mns. Smithsonian was obtained near Realejo, Nicaragua, by Capt. J. M. Dow.

*Tropidonotus dimidiatus* Boie, Isis von Oken, 1827, p. 535. Specimens of this forgotten species have been obtained near Jalapa by Mr. Pease, and sent to the Mus. Academy. It is related to the *T. Grahamii* Gthr., but wants the dorsal bands, and those margining the abdomen. The plumbeous of the superior regions extends to the first row of scales, (third in *Grahamii*),

\* As Fitzinger's Neue Classification antedates Boie's memoir in the Isis von Oken, a strict application of the law of priority requires that the *Lycodon unicolor* of the former work (Boadon D. & B.) should retain its name, while the *scolopax* receive that of *Siphlophis*, Fitz. 1843.

the scales themselves obtuse, (submarginate in *Grahamii*), in nineteen rows. There are nine superior labials, eye over the fourth and fifth, (six or seven in *Grahamii*, eye over third and fourth), one or two preocular, and two or three postocular plates. The head is shorter and broader than in *Grahamii*, hence the loreal is higher than long, instead of longer than high. The external narcs have a more vertical aspect, but resemble those of *Grahamii* and of *Tropidoclonium* sp. in being connected by suture with the labial border only. The prefrontal plates are frequently confluent as described by Boie. Inferior surface uniform yellow; no median caudal band. Size that of *T. leberis*.

*Tropidonotus validus* Cope, Pr. A. N. S. Phil. 1860, p. 342. *Regina valida* Kenn. l. c. 1860, p. 334. *Tropidonotus tephroleura* Cope, l. c. 1860, p. 341. The Californian and Durangoan specimens, assigned formerly to distinct species, differ in little more than in the less elongated head of the latter. A specimen from Utah in Mus. Smithsonian is quite intermediate in this respect, proving that they are not worthy of receiving distinct appellations in the system.

*Tropidonotus celæno* Cope, Pr. Ac. Nat. Sci. Phil. 1860, p. 341.

Inhabits Cape St. Lucas, Lower California. This species and the preceding, the only members of the genus inhabiting the Pacific region of North America, have the number of rows of scales similar to that characterizing the European and Asiatic species, while our Eastern and Southern species of the sipedon type, are different in this respect. They agree in the absence of scale pores with the American species of the type of *leberis*, and the *stolatus* and *quincunciatus* types of Asia. According to Mr. Xantus they are most common in swampy meadows among long grass.

*Tretanorhinus nigroluteus* Cope. Dorsal scales in twenty-one rows, all keeled. Head slightly distinct, narrow. Rostral plate broader than high, separated from the prefrontals by the nasals: each of the latter is subtransverse, the nostril between. Postfrontals as long as vertical; anterior border of the latter equal to the lateral: occipitals elongate, each bounded by seven temporals. Two loreals, anterior smaller; two preoculars, the superior smaller, not in contact with the vertical; two postoculars, in contact with the temporal. Eight superior labials, eye resting on the fourth; inferior labials ten, the sixth elongate, the tenth very small. Two pairs of postabdominal scutella. *Gastrosteges* 136 (tail mutilated); length of body 15 in. 6 lin.

Color above black, tinged with plumbeous as far as the superior half of the second row of scales; below yellow, punctulated anteriorly, especially upon the inferior labials. Upon the anterior third of the body, the punctulations form a narrow band upon the extremities of the *gastrosteges*, separated from the dorsal black by a narrow yellow band. A few irregular spots on the *urosteges*.

One specimen (5568) presented to the Smithsonian Inst., by Dr. Caldwell, from Greytown, Nicaragua.

This species differs from the *T. variabilis* D. & B. in color, in the greater relative size of the postfrontals, and in the presence of carinae upon all the more elongate scales. In both the *Tretanorhini*, the scale-pores are absent. Cuba is the native country of the *T. variabilis*, whence it does not seem to have been often sent. Dr. Lobi has presented it to the Academy, and Prof. Poey to the Smithsonian Inst. It is an interesting species, as exhibiting the full development of the structure towards which we see a successive approach in *Tropidonotus rhombifer*,\* *T. ustus*, *T. cyclo-*

\* Since this species was first made known by Dr. Hallowell, it has been described as *Tropidonotus pogonias* and *Nerodia holbrookii*; it is also very possibly *T. cyclopteron* of Günther. The mental tubercles do not constitute a specific peculiarity, but are most common on all old individuals: they occur on both species of *Tretanorhinus*, *T. rhombifer* inhabits the Mississippi valley as far north as Southern Illinois, where Mr. Kennicott has obtained it.

pium\* and *T. anoscopus*; † i. e. the approximation of the external nares—and consequent restriction of the prefrontal plates—and the narrowing of the superciliary plates, to give that vertical position of nostrils and range of vision so characteristic of the most highly aquatic types of serpents. The union of the prefrontal plates as in *Dimades plicatilis* is but one step further. Between the latter species and *Trop. rhombifer*, the *Tretanorhinus* may be said to be exactly intermediate in respect to position of nares and eye, carination and number of scales, and coloration. Besides this passage from the *Tropidonotinae* to the *Homalopsinae*, there is some analogy or affinity between such species as *Tropidonotus dimidiatus* and *grahamii* and *Hypsirhina enhydris* of the Old World. A similar connection may be traced through *Atretium schistosum*.

*Thamnophis cyrtopsis* Cope. *Eutania cyrtopsis* Kenn. Proc. A. N. S. Phil. 1860, p. 333.

Var. *cyclides* Cope.

A single specimen from Cape St. Lucas, Mr. Xantus' coll. (Smiths. No. 5023,) corresponds in most respects with Mr. Kennicott's description, but differs as follows: The first dorsal row of scales is smooth; there are no spots upon the extremities of the gastrosteges; the seventh upper labial shield is principally bordered with black on its posterior border; there are two rows of small alternating black spots posterior to the post-occipital pair, instead of a single row of large ones; on the anterior third of the body there are two rows of small alternating spots, the inferior in contact with the lateral stripe, covering one or two scales, the superior in contact with the vertebral, and soon disappearing. The inferior series is larger near the middle of the body, but is lost posteriorly. The skin is marked with the usual large spots, forming a zigzag series. The head is very broad posteriorly, the muzzle short, the frontal region very declive.

\* This species has been sent from Florida by Mr. Würdemann to the Smithsonian Inst. Specimens obtained in Southern Illinois by Mr. Kennicott probably belong to the same.

† *Tropidonotus anoscopus* Cope. Scales small, in twenty-three rows, all keeled except those of the first, which are of small size. Scale pores in pairs. Dentition syncranterian. Head oval, muzzle short, obtuse, profile plane. Rostral plate twice as broad as high, its labial border much shorter than the nasal. Nasal plates but little separated anteriorly by the prefrontals, scarcely touching the postfrontals; nostrils subvertical. Loreal higher than long. Preocular narrow, not in contact with the vertical. Prefrontals very small, subtriangular; superciliaries narrow; vertical elongate with parallel lateral borders; occipitals rounded posteriorly, bounded by one large and six smaller temporals. Postoculars two, the inferior and half the superior in contact with one temporal, also a series of small scales which separate the orbit from the superior labial plates. The latter are nine in number, the seventh largest, fifth beneath the middle of orbit. Symphyseal very small, transverse, ten inferior labials; genials elongate. Gastrosteges 143, one divided anal, urosteges 73; total length 14 in., of tail 3 in. 6 lin. General color above, dark plumbeous brown, with blackish vertical bars, alternate upon each side, one, or one and a half scales wide, and three and a half or four scales apart. Beneath dirty brownish white, each scutum brown at the base. Head and jaws brown.

Habitat. Cuba. Mus. Acad. Nat. Sciences.

This is probably the *Tropidonotus cyclopion* with 23 rows of scales of the *Erpetologie Generale*. Compared with Floridan specimens, noted above as the true *cyclopium*, with 29 or 31 rows of scales, we observe the following peculiarities in the latter, which are not shared by the former. The rostral plate is as high as broad; the nasals largely in contact with the postfrontals; the loreal triangular, longer than high; the preocular divided; two large and one small temporal bounding each occipital; eight superior labials, twelve inferior. Seven superior labials are assigned to the *cyclopion* in the *Erpetologie Gen.* In *T. rhombifer*, the aspect of the nares and orbits is less vertical, the rostral plate is as high as broad, and the dorsal scales and labials are different in numbers and proportions from those of the *anoscopus*.

† *Atretium Cope*, *Tropidophis* Gray, 1849, not Bibron, 1843.

*Phimothyra grahamaiae* Cope, Pr. A. N. S. Phil. 1860, p. 566.

This species has been sent to the Smithsonian Institute from Lower California, Mr. J. Xantus' coll.

*Phimothyra bairdii* Cope. *Salvadora Bairdii* Jan. Iconogr. des Rept. Ophid. 1 livr. pl. iii. fig. 2.

This species inhabits the region of Jalapa. A specimen in Mus. Acad. Nat. Sci. exhibits one loreal and two preoculars on each side.

*Conophis vittatus* Peters, Monatsberichte Preuss. Acad. 1860. p. 521.

The genus *Conophis* is allied to *Phimothyra*, *Coniophanes* and *Tomodon*. From the first it is barely separable, differing only in the grooved posterior upper maxillary; the rostral plate is quite similar to that of *P. bairdii*. As in that genus and *Coniophanes*, there are no scale pores. From the last two it differs in the prominent rostral and convex frontal region; *Tomodon* is further distinguished by its single nasal. *T. lineatus* D. & B. Erp. Gen. vii. 936, is apparently congeneric with the *C. vittatus*, differing specifically in its elongate prefrontals, and punctate gastrosteges. Guatemala is the native country of the *Conophis*. Mus. Smithsonian, Capt. John M. Dow's coll.

*Spilotes pullatus* Wagler.

The following observations are suggested by an examination of ten specimens belonging to the museums of Philadelphia and Washington.

Two distinct forms may be distinctly made out. In the one the scales are very large, in from 15 to 18 rows, strongly keeled except the first two. Superior labials in four specimens seven, in one eight; the last, two-thirds the height of the penultimate in three, equally high in two; the fifth very small, not reaching the postoculars in four, reaching them in one. The upper surface of the head usually black, the tail and posterior third of the body black and bandless, in all. Two specimens from Surinam (Mus. Acad.), one from Trinidad (Mus. Gill) and one from Venezeula (Mus. Smiths.) one loc. ign. The second possesses 18 or 19 rows of smaller, weakly keeled scales, those of the first four or five entirely smooth. Superior labials eight, the ultimate as high or higher than the penultimate, the fifth large, approaching or reaching the postocular. The superior surface of the head yellow, crossed by four more or less irregular black cross-bands; the posterior third of the body crossed by numerous narrow, chevron formed cross-bands of yellow; the tail annulated with the same. Three specimens in Mus. Smithsonian from Mirador, Dr. Sartorius' coll. one loc.? Mus. A. N. S.

The first is the "Veränderliche Natter" of Merrem's Beitrage, Heft. 2, pl. xii., and *Coluber plutonius* of Daudin. The *C. pullatus* of Linn., Mus. Ad. Fried., which is *Cerastes mexicanus* Laur. and *Col. variabilis* Nieuwied, is represented by these authors and by Seba as annulated posteriorly and upon the tail, though apparently otherwise similar to the *plutonius*. The second or Mexican form we do not find figured or described. It may be called for the present by the sub-specific appellation of *aureibundus*.

*Pityophis vertebralis* Dum. & Bibr. not Günther. *Pityophis haematois* Cope, Pr. Acad. Nat. Sci. Phil. 1860, p. 342.

The serpent described in the Erp. Generale, and by me, as above, must be identified with the *Col. vertebralis* of Blainville, notwithstanding the imperfect figures and description of the latter author, and the adverse opinion of Günther. The specimens included under this head in the British Mus. Catal. obviously belong to a different species. *P. vertebralis* inhabits only Lower California, so far as known.

*Arizona lineaticollis* Cope.

Head distinct, elongate. Rostral plate rounded in profile, much elevated, the posterior angle right, not reaching postfrontals. The latter three times the

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size of the prefrontals. Vertical longer than broad, the anterior border straight, as long as the occipitals. Five or six small temporals on each side. Nasal plates large; loreal longer than high. Preoculars one or two, postoculars three. Superior labials eight or nine, liable to irregular subdivision; fourth and fifth, or fourth, fifth and sixth entering the orbit. Twelve inferior labials; postgenials very small. Scales small, in twenty-seven rows, the median ten keeled. Tail very short.

General color of a specimen long preserved in spirits: above light brown, beneath paler. The head is without markings. On the anterior part of the body two black bands, two and two halves rows of scales apart, extend for four times the length of the head and terminate each in a narrow elliptic annulus. The latter are nearly confluent with the succeeding pair of annuli, which are very narrow. These increase in breadth posteriorly until near the middle of the body they become confluent on the median line, forming geminate open spots; near the tail they lose the geminate form. Their whole number is 36 pairs, separate or united. Alternating with these is a small series of annuli, which become elongate anteriorly, and finally become short black lines, parallel to, and three scales from, the median pair. A few spots on the extremities of the gastrosteges on the posterior part of the abdomen. Total length, 30 in.; Tail, 3.9 lin.

*Habitat.* Mexico. Mus. Acad. Nat. Sciences.

The American genus *Arizona* now embraces six species; viz. *A. elegans*, *jani*, *pleurostictus*, *reticulatus*, *deppei*, and *lineaticollis*. Three of these have been described by Dnm. et Bibr. as belonging to their genus *Elaphis*, i. e. *Natrix Laurenti* (*Coluber* Gthr.), but that genus is characterized by a differently formed rostral plate, and double anal.

*Drymobius aurigulus* Cope.

Of the group *Masticophis* B. & G. Scales in seventeen rows as in *testacens*, those of the median series very elongate. Crown and muzzle very plane, supercilium and canthus rostralis prominent; eye moderate, muzzle more elongate than in any other species of the genus. Rostral plate rounded, prominent, recurved above. Vertical elongate, posteriorly half as wide as each superciliary, not in contact with preocular. Occipitals elongate, posteriorly truncate. Nasals and loreals very long, the latter encroaching much on preocular. Three pre-, two postoculars. Superior labials eight, fourth and fifth entering orbit; the last equal in elevation and length to the penultimate. Inferior labials ten, fifth largest; postgenials longer than pregenials.

Color above brown—becoming nearly black anteriorly. Cephalic plates light brown shaded with yellow. A narrow yellow band passes round the muzzle from eye to eye. A spot on the temporal region, one on the postoculars, all the labials, the chin and anterior part of the abdomen bright golden; sides of the neck to the fifth row of scales ditto. On the second and third rows of scales of the latter region is a black band regularly interrupted at intervals of about seven scales. It finally becomes continuous, and with a band upon the first row almost excludes the ground color upon the posterior and middle parts of the body. Abdomen dirty yellowish.

Proportions probably similar to those of *D. taeniatus*; (specimen mutilated.)

*Habitat.* Cape St. Lucas, Lower California. Mr. Jus. Xantus' coll.

This curiously marked species most resembles the *D. ornatus* (*Masticophis ornatus* B. & G.) The number of rows of scales is greater; the scales themselves are narrower; the muzzle is more elongate—hence also the nasal and loreal plates; there is one more preocular, and the ultimate superior labial is larger. (Smiths. No. 5793.)

*Lampropeltis boylii*, var. *conjuncta* Cope.

It was observed in these Proceedings, 1860, p. 255, that Cape St. Lucas specimen 1861.]

mens had the scales in the white cross bands black bordered. In specimens from Fort Yuma, the black so prevails as reduce the bands to series of light dots. Thus this variety is allied to the *L. splendida* in accordance with the general resemblance of Lower California reptiles to those of Arizona and Chihuahua.

The genus *Lampropeltis*, defined by Baird and Girard, and distinguished by me from *Coronella Laur.*, at p. 254 of these Proc. for 1860, is separated from the latter genus by a peculiarity not formerly observed. The scale pores are always double; in *Coronella* they are single, as correctly indicated by Prof. Reinhardt's table, p. 222, Vidensk. Meddel. Naturhist. Kjobenh. 1860.

*Lampropeltis polyzona* Cope, l. c.  
Mirador Vera Cruz, Dr. C. Sartorius.

*Lampropeltis micropolis* Cope, l. c.  
A specimen in Mus. Smithsonian from Minatitlan Riv. Mexico, exhibits a few more pairs of rings than a Honduras specimen.

*Hypsiglena ochrorhynchus* Cope, l. c. 1860, 246.  
Inhabits the southern part of Lower California. Bears some resemblance to the young of *Sibon annulatus*.

*Hypsiglena torquata* Cope. *Leptodeira torquata* Gthr., Ann. Mag. N. H. 1860 (March).

Inhabits Nicaragua and Laguna Id. A species nearly allied to the preceding, differing principally in having a transverse light collar upon the neck instead of three longitudinal blotches. A fourth species from the valley of the Rio Grande del Norte is known to me. The genus *Hypsiglena* can hardly be regarded as other than *Coronelline* in form, though so closely allied to *Sibon* among the *Dipsadinæ* as to be scarcely separable from it. Regarding *Sibon annulatus* from Surinam as the true representative of that genus, the present form may be distinguished by the single scale-pores, the ungrooved maxillary teeth, the absence of tendency to irregular subdivision of lateral head-plates, and perhaps by the presence of the two preoculars. The species all seem to be of small size.

*Chersodromus liebmanni* Reinhardt, Vidensk. Meddel. Naturhist. Kjobenhavn. 1860, p. 35, Taf. iv. figs. 10, 11.

This curious serpent, so nearly allied to the *Ninias*, particularly to *N. diademata*, has been sent from Mirador, Vera Cruz, in Dr. Sartorius' valuable collection. The union of the postfrontal plates occurs only in the following genera of serpents, so far as I am aware: *Temnorhynchus Sm.* and *Prosymna Gray*, in Africa. *Hydromorphus Pet.* Central America; *Chersodromus Rhdt.* Mexico, and a genus allied to *Elapomorphus*, from Paraguay.

*Chilomeniscus stramineus* Cope, Pr. A. N. S. Phil. 1860, p. 339.

Inhabits the southern part of Lower California. Specimens in Mus. Smithsonian and Academy, from Mr. J. Xantus.

This genus, with *Toluca*, *Stenorhina*, *Chionactis* and *Sonora*, and perhaps *Conopsis*, forms a little group, characterized by a very prominent transverse and slightly decurved rostral plate.

The form graduates into the ordinary *Calamarian* type. The first mentioned five genera may be thus distinguished:

I. Prefrontal and nasal plates confluent.*	
Dentition glyphodont; scales usually poreless,	<i>Stenorhina.</i>
Dentition isodont; scales uniporous,	<i>Chilomeniscus.</i>

\* To this group belongs *Calamaria degenhardtii*, Berth. Abhandl. Goettingen, 1847, p. 8.

## II. Prefrontal and nasal plates distinct; dentition isodont.

## a. Loreal absent.

Scales uniporous; vertical produced anteriorly; one nasal, Toluca.

## b. Loreal present.

One nasal, two postoculars; rostral much depressed, Chionactis.  
Two nasals, three postoculars: rostral little depressed, Sonora.

Gyalopium and Amblymetopon form another group, characterized by a stout form, distinct head, and recurved rostral shield; size small.

*Chilomeniscus cinctus* Cope.

Rostral plate projecting far backward, entirely separating the prefrontals, encroaching upon the postfrontals; the latter are in contact with the labials. Nostril connected by suture with the fronto-nasal suture. One very small preocular, two postoculars. Seven superior labials, the first longitudinal, the remainder vertical except the last two, which are nearly equilateral. Symphyseal in contact with genials. Scales broad, very smooth, in thirteen rows. Tail very short. Gastrosteges 11, one divided anal; urosteges 21 pair. Total length seven inches, tail eight lines. Ground color white, with a reddish tinge, encircled by sixteen black rings upon the body, and three upon the tail. There are four or five scales in width, and separated by equal spaces; they are narrower on the belly. The head is black from the extremities of the occipital plates to the anterior part of the vertical, and to the second labial plate. Chin shaded with black.

*Habitat*.—Near Guaymas, east coast Gulf of California. Mus. Compar. Zoology Cambridge, No. 24.

The coloration is that of the species of *Chionactis*.

*Stenorhina lactea* Cope.

Similar in most respects to *S. ventralis*. Tail one-seventh of the total length. Scales in seventeen rows. Occipital shields longer than in *S. ventralis*, their common suture much longer than their supercilio-ocular. Vertical more elongate, with shorter latero-posterior borders. Frontals broader, (longitudinally); rostral plate more prominent. Postnasal in contact with preocular by a very short suture. Seven superior labials, broader than in *S. ventralis*. Six inferior labials, the first homologically equal the first and second. Preanal shield divided.

Total length 25 inches 5 lines; tail 3 inches 7 lines.

Color above brownish white; beneath paler. An indistinct band passes through the temple and eye to the muzzle.

*Habitat*.—Guatemala. Specimen 4944, from La Union, Capt. Jno. M. Dow's coll.

*Stenorhina ventralis* Dum., *Bibr.*, Cope, Pr. A. N. S. 1860, 242.

A common serpent near Mirador, Vera Cruz, as proven by Dr. Sartorius. In this species the scales are uniformly poreless; in *S. lactea* a single pore is rarely seen; in *kennicottiana* (l. c. 242) a regular pair of pores, one odd, or one median pore, are sometimes observable.

*Boa eques* Eyd. et Souly.

Capt. J. M. Dow has sent this species from Guatemala to the Academy; another specimen in the same collection is said to have come from Caraccas. Greytown, Nicaragua, is a locality whence it has been sent to the Smithsonian Institution.

The scales of the orbital ring do not always rest upon the superior labials. The species is, however, easily recognized by its stout form, approximate spots, short, elevated muzzle, and general dark color. The rostral plate is always more constricted at the base than in *B. constrictor*, the labials less numerous and more elevated.

*Loxocemus bicolor* Cope, Pr. Ac. Nat. Sci. Phila. 1861, p. 76.

This genus, discovered in Guatemala by Capt. Dow, seems to confirm by its structure the propriety of the arrangements of Müller and Duméril, in which the Peropoda or Aprotrodonta is regarded as an equivalent of the other subordinate divisions of the Colubridæ or non-venomous Eurytomata.

According to Prof. Reinhardt, nearly all the genera of Boiæ have uniporous scales; in *Loxocemus* they are poreless, as in the Calamarinæ. Other resemblances to these serpents have been previously pointed out, loc. sup. cit. The os postfrontale is elongate falciform, articulated at its proximal extremity with an anterior prolongation of the os parietale, and slightly with an os supraorbitale. Between the latter bone and the os frontale a second superorbital is intercalated. The presence of these bones, together with the biserial urosteges, constitute points of affinity with the Pythones. The os mastoideum and o. quadratum are short and stout. The o. nasalia are slightly contracted by the production of the o. prefrontalia, but again expand, and unite with the o. frontale by an extensive suture. These two points are Erycine. The Boiæ seem, therefore, to be divisible into four subgroups—the Pythones, the Boæ, the Loxocemi and the Eryces. The osseous structures typical of these groups are: 1st, supraorbital bones and a denticerous intermaxillary; 2d, no supraorbitals or intermaxillary teeth; prefrontals which separate the nasals from contact with the frontals, (observed in *Enygrus*, *Ungalia*, *Homalochilus*, *Boa*, *Chilabothrus*, *Eunectes*, *Epicrates*, *Xiphosoma*); 3d, supraorbitals present, intermaxillary edentulous, nasals articulating broadly with frontals, suspensoria short, stout; 4th, no supraorbitals or teeth on the intermaxillary; nasals articulating broadly with frontals, suspensoria short, stout.

*Lichanura trivirgata* Cope.

The genus *Lichanura* may be diagnosed as follows:

General form abbreviated and stout; tail short, thick, obtuse at the extremity. Head slightly distinct, elongate, subcompressed; muzzle rather constricted; eye small, pupil vertical. Rostral plate elevated; nostril between two plates, the anterior in contact with that of the opposite side, upon the median line. Posterior to these the upper surface of the head is covered with smooth scales. Labial plates without pits. Scales smooth, broad, poreless. Spurs conspicuous. Gastrosteges narrow. Fronto-nasal suture extensive.

This genus of Eryces differs from *Cusoria* Gray in its elevated rostral plate and its two nasal plates. In *Cusoria* there are three of the latter, and a depressed rostral. The form, etc., of the head is somewhat similar to that of *Homalochilus* among the true Boæ, which, however, possess a nostril bordered by three shields. *Acrantophis* Jan., the true position of which it would be interesting to know, appears to be an ally. The irregular squamation of the superior surface of the muzzle the acute tail, and partially divided urosteges of that genus, separate it.

*L. trivirgata* inhabits the southern region of Lower California, where Mr. J. Xantus has obtained it for the Smithsonian Institution (Nos. 2277 and 2287) and the Academy. He found it in swamps among the mountains. Its scales are in forty longitudinal rows, the inferior a little larger than the others. Ten scales in the ocular ring: superior labials fourteen or fifteen, the anterior three highest. Lorcals, three superior vertical, two inferior horizontal. Rostral plate prominent, elevated, recurved, quinquelateral, its labial border as long as its nasal. Inferior labials fifteen, the anterior five longest. A short mental fissure. Total length 25 in., tail 4 in.

General color pale yellowish, tinged above with brown. The belly and flanks are irregularly speckled with liver brown. Superiorly there extend from the muzzle to the end of the tail three deep liver brown bands, the median four, and the two lateral, five scales wide, separated by intervals three and a half scales in width.

The coloration of this handsome Boa is altogether unique in the family. It calls to mind the *Phimothyra* of the same region.

*Charina plumbea* Cope. *Wenona plumbea et isabella* Bd. et Grd., Catal. Serp. 1853, p. 139.

The Erycine genus *Charina*, established by Gray in 1849, has since, as it appears to me, received the names of *Wenona*, (Bd., Grd.,) *Rhoptrura*, (Peters. Monatsber. Preuss. Acad. 1858, p. 504), and *Calabaria* (Gray, P. Z. S. 1858, 155.)

The two latter authors have not, however, made us acquainted with the osseous structure of the African species upon which their genera are founded. In the American species the *os frontale posterius* is wanting, which constitutes an approximation to the Tortricidæ: the same peculiarity is possessed by *Lichanura*, though its external form does not betray the affinity thus expressed. In the typical subgroup of the Erycæ this bone is present. The two species of Baird and Girard's *Wenona* are probably identical, as suspected by Dr. Cooper, in the Nat. History of Washington Territory. That the *C. plumbea* differs from *C. Bottæ* Gray, appears to us doubtful. The former occurs at Guaymas, Sonora. Mus. Comp. Zool. Cambridge.

#### TYPHLOPSIDÆ.

*Stenostoma humile* Cope. *Rena humilis* Baird et Girard Catal. Serp. Smiths. Inst., 1853, p. 143.

Specimens from Cape St. Lucas are identical with those from the parallel of Fort Yuma, east of the mountains. In both I have found the scales to be in fourteen longitudinal rows, not fifteen, as described.

*Rena* B. & G. has been stated by Prof. Peters (Monatsber. Berl. Ac. 1857, 402) to be identical with *Stenostoma Spir*, as is obviously the case. The second species found in the United States, *S. dulce*, inhabits Texas and Florida (*Kirtland coll.*) The scales of this also I find to be in fourteen rows.\*

Of the sixteen species of serpents which Mr. Xantus has obtained near Cape St. Lucas, but eight are known to inhabit other regions. Of these, the *Lampropeltis* and *Stenostoma* have been found near the head of the Gulf of California. The *Trimorphodon* may have been found in Arizona. The *Phimothyra* inhabits Chihuahua, Sonora and Arizona; the *Thamnophis*, Durango and Coahuila; *Tropidonotus validus*, Durango and Utah; while *Caudisona atrox* and *Drymobius testaceus* extend as far east as Texas and Arkansas.

Of the eight peculiar species, seven belong to genera which are represented by allied species in the above regions, *Lichanura* only not having been found elsewhere. This is evidence of the identity of the Cape fauna with the Sonoran and New Mexican, as pointed out by Prof. S. F. Baird, Proc. A. N. S. Phila. 1859, p. 299.

One species of the sixteen (*Lampropeltis boylii*) inhabits the State of California, but the Lucasian specimens have much the character of those of another species (*L. splendida*) found in Arizona. But five of the twelve genera are represented in the first mentioned region. The Californian genus *Charina* has been found at Guaymas, on the east coast of the Gulf of California, but not in Lower California.

While two of the species inhabit Texas, seven of the genera are represented there. † Those not represented are *Hypsiglena*, *Chilomeniscus*, *Lichanura*,

\* Many of the species noticed in this enumeration have been obtained through, or exist only in, the museum of the Smithsonian Institution, Washington. The author desires to express his acknowledgements for the opportunities obtained under the liberal constitution of that institution as interpreted and executed by its Secretary, Prof. Joseph Henry, LL. D.

† Prof. Baird, Pr. A. N. S. Phil. 1859, p. 300, alludes to species allied to *Arizona elegans* and *Scotophis Emoryi* from the Cape. These I have not seen.

Trimorphodon and (?) Phimothyra. Elaps, extending westward to the Gulf of California, has not yet been discovered at the Cape.

No species has yet been found which is common to Cape St. Lucas and the country of Vera Cruz and Jalapa. The genera common to both are Caudisona, Drymobius, Thamnophis, Tropicodonotus, Lampropeltis and Phimothyra; all found also in Texas and the Southern United States.\* They form but one-half of the whole number included in the Lucasian fauna.

Genera characteristic of Jalapa, and not known to exist in Lower California, Arizona, or Texas, are Catostoma, Ninia, Chersodromus, Pliocercus,† Stenorrhina, Himantodes, Bothrops and Bothriechis; all of which, except Chersodromus, are represented in South America and intermediate localities. The latter statement is true as regards Sibon, Coniophanes, and Spilotes, which Jalapa shares with Texas, and of Arizona and Dryophis, which are found in Sonora. Omitting Thamnophis and Lampropeltis as common to the two faunae, we find here but one nearctic type (Tropicodonotus) among the many neotropical.

We know but little of the herpetology of Guatemala west of the Cordilleras. Caudisona duriss is the only serpent yet obtained there, which we suppose to be found in Vera Cruz. The ten known genera are identical, excepting Loxocemus, and ?Conophis. Other genera which have not been found north of Central America, are Colobognathus, Hydrodipsas, Hydromorphus, Thamnocentris, Dipsas, Tomodon, Xenodon, Scolecophis, Oxyrhopus; the first four are not known to extend into South America. Trimorphodon, Hysiglena and Tantilla, are the only genera known to be common to the fauna of Central America and that of Lower California, Sonora and Arizona, which may be called the Sonorian.

Comparing this last subfauna with that of Southern Texas, at least five degrees further south, we find that while neotropical genera are to nearctic in the former in an equal proportion, in the latter they are as one to four. Of five genera peculiar to the former region, four have neotropical representatives, none nearctic. No genus is peculiar to the Texan region. Rhinochilus, common and peculiar to the two regions, is nearctic in relationship.

The probabilities are then, that the artificial line separating the neotropical and nearctic groups of faunae must be placed several degrees further north on the west of the Cordilleras than on the eastern coast region. It is also probable that the tropic of cancer, the line proposed by Dr. Günther, will be found to be nearly the true position of its eastern extremity.

#### List of the Mollusca inhabiting the neighborhood of Philadelphia.

BY W. M. GABB.

Believing that the best way of obtaining an accurate knowledge of the geographical distribution of species, is by the publication of numerous local lists, I have prepared the following catalogue of Mollusca of our neighborhood. Most of the species have been collected by myself this season. I have received valuable information and assistance from several of my friends, all of which is acknowledged at the proper place. I have been careful to point out the principal localities, more especially to assist young collectors.

#### GASTEROPODA.

##### MELANIIDÆ.

*Melania Virginica Say*.—Found everywhere. The specimens from the Schuylkill appear to be somewhat larger than those from the Delaware.

\* *Phimothyra grahamiae* has been obtained at Port Mojave, California, by Dr. Cooper, vid. Proc. Cal. Acad. Nat. Sci., 1861, p. 123.

† Is not this *Elapochrus* Peters? A species inhabits New Grenada, and a third (*P. aequalis Salu.*) eastern Guatemala.

"Finest in the Wissahickon and Schuylkill, above the dam." (Tryon.) *M. multilineata* Say, and the other names, quoted as occurring in this neighborhood, are synonyms of the above.

## RISSOIDÆ.

*Leptoxis altilis* Lea.—Very abundant at Gloucester; also found in the Schuylkill, and in the ditches along Broad street, near League Island.

*Amnicola grana*.—Fairmount, Wissahickon, near Chestnut Hill, rare in ditches, south Broad street, with preceding.

*A. lapidaria* (Say sp.)—Under logs in a moist meadow above Red Bank, N. J. This locality was first pointed out to me by my friend, Dr. G. H. Horn, who discovered this species with several others in abundance. On visiting the spot with him, we obtained in about an hour nearly 300 specimens of this, besides other rare shells. I have never seen this shell from any other locality, though Dr. Leidy informed me that he has occasionally seen single individuals.

The habitat of the animal is curious. Belonging to a genus, all the other species of which, as far as I know, are strictly inhabitants of the water, we found this species in a spot where it could not possibly reach water nearer than a hundred yards, and associated with *Helix*, *Succinea*, *Carychium*, *Vertigo*, &c.

*A. limosa* Say.—Wissahickon, near Chestnut Hill, and Delaware River, below Gloucester. "Schuylkill, above the dam." (Tryon.)

*A. lustrica* Say.—"Wissahickon, above Chestnut Hill, under stones." (Tryon.)

*A. porata* Say.—League Island, in ditches; Schuylkill River, at Fairmount; Wissahickon, near Chestnut Hill.

## VIVIPARIDÆ.

*Vivipara* (*Paludina*) *decisa* Say.—Most numerous in the Schuylkill, and at the extremity of League Island. Prefers muddy bottoms. Extremely common at all the mill-dams on the Wissahickon. (Tryon.)

*V. subcarinata* (Say sp.)—Preponderates in the Delaware, especially on the gravelly bottoms of the New Jersey side. Found also in the Schuylkill, but not so common. Very good specimens occur in the Wissahickon. "Kaighn's Point, N. J., very fine specimens." (Tryon.)

## VALVATIDÆ.

*Valvata tricarinata* (Say sp.)—Rare. Found occasionally in the Wissahickon, especially near Chestnut Hill, where it grows quite large. Delaware River. (*teste* Say.) As far as I am aware, the variety *sincera* has not been seen in this neighborhood. Mr. Tryon, one of the best collectors in the city, says he has never seen it here.

## HELICIDÆ.

*Succinea ovalis* Gld. non Say.—Abundant in the meadow near Red Bank, mentioned above.

*S. varva* Say.—Near the Falls of Schuylkill; near Manayunk, on the west side of the Schuylkill; near Red Bank, N. J.; "near Germantown, estate of E. K. Tryon." (T.)

*Achatina lubrica* Müll.—Rare. "Isolated individuals west of the Schuylkill." (Leidy.)

*Vertigo modesta* Gould.—Meadow near Red Bank, rare.

*Helix albolabris* Say.—“Damp, shady woods and old quarries. I have found them at twelve or fifteen feet elevation on the perpendicular walls of an old quarry, near Germantown.” (Tryon.)

*H. alternata* Say.—“New Jersey, above Cooper’s Point,” (Leidy,) and found by Dr. Horn and myself, at various points around the city, especially at “Robison’s Knoll,” near the mouth of the Wissahickon, and on the west side of the Schuylkill, in damp places, usually under stones.

*H. appressa* Say.—“One specimen found near Germantown, on the estate of E. K. Tryon.” (T.)

*H. arborea* Say.—Common in logs and stumps, under bark.

*H. cellaria* Müll.—This species is said by Say (under the name of *H. glaphyra*) to have been found in Philadelphia, but I am not aware that it has since been reported by any one else. See Binney, vol. 4, p. 114.

*H. chersina* Say.—Banks of Delaware, ten miles above Philadelphia, (Phillips teste Say.) “Near Germantown, rare.” (T.)

*H. concava* Say.—I have found two specimens of this species, both west of the Schuylkill, one below the Columbia Bridge, the other opposite Manayunk. Mr. Conrad tells me that it was once very common west of the city.

*H. electrina* Gould.—Meadow near Red Bank, abundant. “One of the most numerous species around Germantown.” (T.)

*H. fallax* Say.—Robison’s Knoll, near the mouth of the Wissahickon, abundant; also found common in the woods along the Schuylkill. “Around Germantown, abundant.” (T.)

*H. hirsuta* Say.—Robison’s Knoll and west of the Schuylkill. “One of our commonest species. I obtained 25 from a stump last season, and 50 more from the same stump this summer.” (T.)

*H. labyrinthica* Say.—East side of Schuylkill, near Falls of Schuylkill village. Common near Germantown. Mr. Tryon says that this species lives more exposed to the sun, and seems to need shade and moisture less than perhaps any others of our native species, resembling, in this respect, the European *Helices*.

*H. ligera* Say.—Abundant in the meadow near Red Bank, and found occasionally in the woods west of the Schuylkill.

*H. lineata* Say.—“Near Germantown.” (Tryon.)

*H. monodon* Racket.—Probably should be considered as identical with *hirsuta* “Germantown, one or two.” (Tryon.)

*H. pulchella* Müll.—Germantown (Tryon); gardens in Philadelphia (Leidy); found by myself under bark in the woods near the Falls of Schuylkill, and by Dr. Horn and myself near Red Bank.

*H. suppressa* Say.—Robison’s Knoll, mouth of Wissahickon. “Most common of the small species, Germantown,” &c. (Tryon.)

*H. thyroidus* Say.—“Germantown, plentiful on the estate of E. K. Tryon.” (T.)

#### LIMACIDÆ.

*Tebennophorus Carolinensis* Binn.—One specimen found by Dr. Horn and two by myself, north of the city. Exact locality forgotten.

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*Limax agrestis* Müll.—Common under stones and bark, sometimes in very exposed situations; also in dark woods.

*L. campestris* Binn.—Generally found with the above. I have found both these species everywhere.

## ELLOBIDÆ.

*Carychium exiguum*.—Meadow near Red Bank.

## LIMNÆIDÆ.

*Limnæa catascopium* Say.—Abundant in the Delaware; also found in the Schuylkill; not uncommon in the Wissahickon.

*L. columella* Say.—Abundant in standing water, especially in the ditches on and near League Island; in a brick pond west of the Baltimore Railroad Depot, I found it swarming; some specimens from this locality were more than an inch long. I have observed it also in the ditches, and even gutters along the roads in New Jersey, near Camden. Also “abundant in ponds near Germantown.” (T)

*L. decidiosa* Say.—Everywhere. Germantown (Tryon), Wissahickon, Schuylkill, League Island, but most rarely found in the rougher waters of the Delaware. This, with the *L. columella*, appear to prefer still and even semi-stagnant water, while the other two species are rarely found but in the larger streams, and generally on a sandy or gravelly bottom. Mr. Tryon thinks this is the most common species of the genus in this neighborhood.

*L. fragilis* Say.—This shell, if it is at all distinct from *L. catascopium*, is always found in the same localities. I have collected it principally in the Delaware, below Gloucester. I cannot see where the line is to be drawn to separate this from the more elongated varieties of the other.

*Physa heterostropha* Say.—Occurs in almost every body of water about Philadelphia. It is the most abundant shell of our vicinity. I cannot find any data on which to recognize the species *P. ancillaria*. I have taken hundreds of the *Physas* of our waters, and tried to draw some line to separate the two species; the height of the spire, the width of the mouth, the shoulder of the body whorl, all take such an infinity of forms, that, although I acknowledge to not having examined the animals of the two typical forms, yet, from the data before me, I am satisfied that these two so-called species cannot be separated on any characters based on the shells.

*Planorbis armigerus* Say.—“Wissahickon, rare.” (T.)

*P. bicarinatus* Say.—Found almost everywhere, especially in the Delaware. Very abundant in the Schuylkill and its tributaries.

*P. deflectus* Say.—Beach at Gloucester; ditches, South Broad St. near League Island.

*P. exactus*.—Wissahickon, near Chestnut Hill and brick ponds west of the Baltimore depot.

*P. lentus* Say.—“Delaware, and Haines’ Pond, 1½ miles from Germantown. Very rare.” (T.)

*P. parvus* Say.—I have only found this species at Gloucester. “Ditches, South Broad St.” (Tryon.)

*P. trivolvis* Say.—Common in the Delaware, more rare in the Schuylkill. “All the ponds around Germantown, but always rarer than *bicarinatus*.” (T.)

*Ancylus rivularis*? Say.—On stones in the Schuylkill, above the dam. Rare in the Wissahickon. I am not quite positive about the identification of 1861.]

this species, after a comparison with the original of the figure in Haldeman's monograph. It corresponds more nearly with this species than any other however, and I have yielded to the opinion of Mr. Tryon, who thinks this to be the species.

## CONCHIFERA.

## CYRENIDÆ.

*Sphærium sulcatum* Lam. (*Cyclas similis* Say.)—Wissahickon; Delaware, opposite the city, and in the ditches of League Island, where the finest specimens are found. Also, more rarely, in the Schuylkill. "A very small species of *sphærium* is found in Tryon's pond." (Tryon.) See Hartman's Cat. Shells of Chester Co.

*Pisidium abditum* Say.—Generally found with *S. sulcatum*, but more rare.

## UNIONIDÆ.

*Unio cariosus* Say.—Most abundant about Gloucester. "Very common at Bristol and Tacony, and in the canal through Smith's Island." (T.)

*U. complanatus* Lea.—Everywhere. The best specimens are found at the extremity of League Island, and in the still waters of the Schuylkill. On gravelly bottoms the beaks are often very much worn. I found one specimen at the lower end of Peter's Island, in the Schuylkill, with two lateral teeth in each valve. "Very fine specimens at Kaighn's Point." (Tryon.)

*U. Fisherianus* Lea.—I discovered one specimen of this shell in the Schuylkill above Girard Avenue bridge. This is the only occasion, I believe, on which it has been seen so far north.

*U. heterodon* Lea.—Rare. Schuylkill below the Fairmount dam, (Lea.) Mr. A. J. Schafhirt found it on one occasion above the dam. "Darby Creek." Lea.

*U. nasutus* Say.—Everywhere. The principal localities are Gloucester, the Schuylkill river above the dam at Fairmount, and the extremity of League Island. At the latter place the largest individuals are found, and those from Gloucester sometimes exhibit the colored rays. "Little Perkiomen Creek, with a dark brown epidermis and more ponderous than usual." (Tryon.)

*U. ochraceus* Say.—More abundant at Gloucester than elsewhere, but occasionally found in the Schuylkill and Wissahickon. "There is no place where this shell attains such perfect magnificence as at League Island." Tryon.

*U. radiatus* Lam.—Same as the preceding species. "Very good specimens at League Island." (Tryon.)

*U. Tappanianus* Lea.—Is an inhabitant of the Schuylkill River, and may possibly be found near the city.

*Margaritana undulata* Lea.—Comparatively common in the Schuylkill and Wissahickon. Occasionally met with in the Delaware. "Magnificent, though rare, in the head waters of Frankford Creek, on the North Pennsylvania Railroad." (T.)

*M. rugosa* Say.—"Same locality." (T.)

*Anodonta fluviatilis* Lea.—Fine specimens occur in a dam on Mill Creek, at a place called Mill Town, two miles above Frankford. Not common in the Wissahickon or Schuylkill, but abundant at the extremity of League Island in the ditch and in the river. Also abundant at Gloucester. "Robert's Pond, 22d Ward; Wingohocking Creek and Silver Lake, near Germantown, at the latter place specimens have been taken  $4\frac{1}{2}$  inches wide." (T.)

*A. implicata* Say.—Gloucester, Newtown Creek and League Island.

[Sept.

*Oct. 1st.*

Vice President BRIDGES in the Chair.

Twenty-six members present.

The following papers were presented for publication :

“On the American Chilopoda, with a Catalogue of all the specimens in the collection of the Smithsonian Institution,” by Horatio C. Wood, Jr.

“Description of a new species of Thelyphonus,” by Horatio C. Wood, Jr.

“On the Reptiles of Sombrero and Bermuda,” by E. D. Cope.

Description of a new species of Rodent of the genus *Spermophilus*,” by J. H. Slack, M. D.

*Oct. 8th.*

Vice President BRIDGES in the Chair.

Twenty-nine members present.

The following papers were presented for publication :

“Description of new Cretaceous Fossils, collected by the Northwestern Boundary Commission on Vancouver and Lucia Islands,” by F. B. Meek.

“Descriptions of new species of Cretaceous Fossils from New Jersey, Alabama and Mississippi,” by Wm. M. Gabb.

*Oct. 22d.*

Mr. LEA, President, in the Chair.

Twenty-four members present.

The following papers were presented for publication :

“Catalogue of Land and Fresh-water Molluses, collected in British North America by Messrs. Kennicott and Drexler, and deposited in the Smithsonian Institution,” by W. G. Binney.

“Notes on the Molluses of the Peninsula of California,” by W. G. Binney.

“Description of two new species of *Helix*,” by A. D. Brown.

*Oct. 29th.*

Vice President BRIDGES in the Chair.

Twenty-two members present.

On report of the respective Committees, the paper entitled

“On the American Chilopoda, with a Catalogue of all the specimens in the Collection of the Smithsonian Institution,” by Horatio C. Wood, Jr., was ordered to be published in the Journal, and the following in the Proceedings :

1861.]

Description of a new species of the genus *THELYPHONUS*.

BY HORATIO C. WOOD, JR.

*T. stimpsonii*.—Cephalo-thorax closely resembling that of *T. giganteus*. Cheliceres strongly curved. Their superior surface roughened by minute tubercles or granulations, the inner, pilose. The first or basal joint very wide above, armed on its inner superior margin with five irregularly radiating spines, the posterior three of which are quite small, and the third somewhat longer than the other two; the fourth is rather larger, its length being about twice that of the third, the fifth is shorter than the fourth, but is next to it in size. The space between the fourth and fifth is greater than the intervals between the others. The inferior inner margin armed with two small spines. Second joint provided with a very minute spine on its superior, and a larger one on its inferior inner margin. The third joint has on its superior inner margin two minute spines and a long robust finger, bifid at its extremity and strongly terrate on its anterior edge. The superior inner margin of the fourth joint and both margins of its finger strongly serrate. Abdomen very similar to that of *T. giganteus*, but the first joint has on its lower surface a deep median semicircular depression, with a much smaller one on each side.

We have seen but a single specimen brought from Japan by Dr. Stimpson of the North Pacific Exploring Expedition.

Length of body one inch and a half, of cheliceres three quarters of an inch.

## On the Reptilia of Sombrero and Bermuda.

BY E. D. COPE.

The only terrestrial animal inhabitants of the island of Sombrero, are stated\* to be a centipede and a lizard. The former is the *Scolopendra torquata* of Wood; the latter I propose now first entering upon the zoological record.

*Ameiva corvina* Cope.—Teeth in young and half grown specimens bicuspid posteriorly, occasionally a third cusp; in adults a few of the posterior maxillaries and mandibulars bicuspidate, the smaller cusp antero-internal. Number 20, 5-5.20; 21, 21. Head and in particular the muzzle, narrow, elongate, slightly decurved. No-tril in internasal, or nasal suture. The former plates slightly in contact medially. Fronto-nasal longer than broad; prefrontals ditto, extensively in contact medially. Four supra-oculars, posterior very small, the suture between second and third continuous with the posterior line of the frontal plate. The latter is hexagonal, a little longer than broad; presents a sub-rectangle anteriorly, and an obtuse angle posteriorly. Two fronto-occipitals, longer than broad, usually in contact, forming with the two occipitals on each side a series curving outwards, separated by granulations from the supra-ocular series. Interoccipital irregular, sometimes divided. Numerous small irregular plates upon the occiput. Rostral a little prolonged upon each labial suture. Superior labials six, inferior five, in contact posteriorly with two oval plates. Symphyseal and mental each broader than long; infralabials five, anterior pair extensively in contact, the posterior separated by granulations from labials. Gular scales small, smooth, hexagonal; those of the posterior gular fold larger than those of the anterior. Ventral plates in twelve or fourteen series, those of the external, small, rounded. Anus bordered with granules: anal plates four, large, arranged as part of a quincunx pattern, surrounded by several smaller shields. One row of large transverse anterior femoral plates, and four series of subhexagonal plates posterior and inferior to it. Exterior sub-

\*Mr. J. B. Hanson, in Proc. Acad. Nat. Sci. Phil. 1859, p. 111.

tibial series of nine plates, fifth and sixth from the foot largest; inner rows three. Heel devoid of tubercles; soles uniformly granular. Scales of the tail-whorls weakly keeled. Scales of back and sides very small, smooth, rounded. An antibrachial patch of six or seven narrowly transverse shields; posterior brachial patch not defined, composed of small hexagonal scales. Palm with two small tubercles near base of external digit. Femoral pores 36 in male, 32 in female. Length of head and body to vent, 4 in. 10 l., vent to end of tail 11 in. 4 l., head to posterior gular fold 1 in. 7 l., femur (anterior) 1 in., tibia (external) 10 lin., foot with fourth digit, 1 in. 7 l.

Color, black; the lower surfaces tinged with glaucous green.

This addition to the numerous list of Ameivæ fills a new position in the genus. It is not closely allied to any species known to us, though its facies is much that of *A. dorsalis* of Jamaica. Museums Acad. Nat. Sci. (Mr. Hanson,) and Smithsonian, (Mr. A. H. Rüse.)

We are informed by Mr. J. M. Jones, in his "Naturalist in Bermuda," that a species of "Scincus" inhabits the islands, and that it is the only indigenous true reptile. He notices its resemblance to *Plestiodon laticeps* ("*S. fasciatus*,") of the United States, and gives a description of an old male specimen. The Smithsonian Institute having liberally loaned us specimens (No. 4737) obtained by Hon. J. H. Darrell, I am enabled to state its specific characters, as follows.

*Plestiodon longirostris* Cope.—Form much as in *P. laticeps*, the tail a little thicker, the muzzle more narrow and elongate. The anterior extremity extended forward reaches the anterior border of the orbit; the posterior reaches to beyond the appressed elbow, but not to the axilla. Rostral plate as high as broad, less depressed than in *laticeps*: nasal small; nasofrenal smaller, trapezoid; anterior frenal as long as high. Eight superior labial plates, the sixth and seventh bordering the inferior palpebra. Each occipital bounded by two temporals, (sometimes confluent) and a postoccipital; the anterior temporal bounded by two inferior temporals, the anterior small, the posterior larger than the eighth upper labial. Inter-occipital large, rounded posteriorly, very acute anteriorly. Fronto-parietal plates gemmiform, in contact by their inner angles. Supra oculars four; anterior supra-ocular small, barely or not in contact with the fronto-nasal. Inferior palpebra granular; a series of six to eight vertical scales beneath the marginal row. Supranasals large, considerably in contact; internasal transverse subtruncate posteriorly; fronto-nasals as long, or more frequently longer than broad, extensively in contact. Frontal elongate, in front obtuse, posteriorly acute angled. Inferior labials seven; symphyseal deeper than in *laticeps*; a large seven-sided mental in contact with two labials on each side, two infralabials posteriorly, and the symphyseal anteriorly. Three transverse infralabials on each side, the anterior not separated by a postmental. Three slightly prominent granules upon the superior part of anterior auricular border. Digits compressed; of the posterior the fourth has twice the extent of the fifth. Sole tuberculous externally and internally; medially granular; palm tuberculous posteriorly. Scales small, especially upon the sides; rows from 39 to 42. Preanal plates four, the median pair very large, the exterior very small. Total length 6 in. 6 lin., tail 3 in. 9 lin. Color above, from rusty to ashy brown, paler on the tail. A white line commences at the anterior angle of the orbit, and extending above the latter, reaches as far as the crural region. It is margined with black superiorly, and separated from that of the opposite side by eight rows of scales. Beneath it, the sides are black or brownish for a width of three and a half scales, beneath which shade is another narrow white line, extending from beneath the orbit to the groin. The dark color of the sides extends upon the tail for one-third its length. The under surface of this member, of the extremities and belly, greenish blue; throat and chin yellowish. In younger specimens a light line upon each canthus rostralis is analogous to those which unite and form the median dorsal band in *P. laticeps*.

There are nearly ten more rows of scales in this species than in *P. laticeps*; the latter has six preanal plates, of which the median pair is not so disproportionately large; also the frenals and nasofrenal are narrow and erect.

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**Description of a new Species of Rodent of the Genus SPERMOPHILUS,  
from Texas.**

BY J. H. SLACK, M. D.

*SPERMOPHILUS BUCKLEYI*, n. s.—Size about equal to that of the *Sciurus cinereus*. Neck, limbs, sides and posterior half of body, grizzled white and black, the hairs being black at the base and annulated with broad bands of black and yellowish white; a broad black patch commencing at the tip of the nose, covering the shoulders and terminating in a point at about the tenth dorsal vertebra, tail about two-thirds the length of the body, covered with long annulated hairs. Ears small. Soles naked.

*Measurements from the dried skin.*—Body, 13 inches; tail to end of vertebræ, 7.5; to end of hairs, 11; hind feet, 2.3. Length of lower jaw, 1.5.

*Habitat.* Pack-saddle Mountain, Llano Co., Texas.

This curious Spermophile was presented to the Academy by Mr. S. R. Buckley, of the Texas Geological Survey. It was captured alive by one of his party, and kept by Mr. Buckley for some time as a pet. He describes it as very gentle and docile. Its favorite food was acorns, green oak balls and milk; of the latter it appeared extremely fond. Its voice he describes as similar to the chirping of a young robin. This species is quite abundant in the vicinity of Pack-saddle Mountain. It is gregarious and resides in the holes and clefts of the rocks. When alarmed it runs along the faces of the almost perpendicular cliffs with great agility, its body, from the shortness of its limbs, appearing to touch the ground. The specimen as presented is unfortunately in a very bad condition, consisting of a flat furrier's skin apparently much distorted, and the lower jaw.

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**Descriptions of new Cretaceous Fossils collected by the North-Western  
Boundary Commission, on Vancouver and Sucia Islands.**

BY F. B. MEEK.

The fossils described in this paper are the new species contained in the collections of the North-Western Boundary Survey. Full illustrations, and more extended descriptions of these and other species formerly described by the writer, from Vancouver Island, will appear in the Report of that Survey; which will also contain a report by Mr. George Gibbs, geologist of the expedition, on the general geology of the country along the boundary line.

In 1857 I announced the discovery of Cretaceous rocks on Vancouver Island, in a paper published in the fourth volume of the Transactions of the Albany Institute. The species described in that paper, as therein stated, were evidently from two distinct rocks, one of which was unhesitatingly referred to the Cretaceous system; while the other,—owing to the fact that all the specimens obtained from it belonged to new species, of genera common to the Cretaceous and Jurassic,—was regarded as doubtful, though probably also of Cretaceous age.

A subsequent examination, however, of these last mentioned specimens, (from Nanaimo, on Vancouver Island) led me to suspect from the affinities of some of the species, that they might be Jurassic, which was stated in a letter to Dr. Newberry, who mentioned it in his report on the Geology of Capt. Williamson's Pacific Rail Road Survey.

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A careful review of the subject, with the aid of the more extensive collections brought in by the Boundary Survey, fully establishes the correctness of my first suggestion in regard to the Cretaceous age of the doubtful beds at Nanaimo. The species from the other rock referred at first to the Cretaceous, although sent to the Smithsonian Institution mingled with others from Nanaimo, are now known to be from Komooks, a locality some seventy miles north-west of Nanaimo, on the eastern shore of Vancouver Island.

Of these two Cretaceous formations, that at Nanaimo is apparently the older; while the deposits on Sucia Islands, (a small group in the Gulf of Georgia, about seventy miles south-east of Nanaimo) belong to the same horizon as the Komooks beds.

### *Descriptions of Species.*

#### LAMELLIBRANCHIATA.

*INOCERAMUS SUBUNDATUS*.—Shell (left valve) broad ovoid or subcircular in outline, rather compressed; anterior margin rounding regularly from near the beaks into the base, so as to form with the latter a semicircular curve; posterior side rather irregularly rounded, its most prominent part being near the middle, hinge margin straight, equalling about half the entire length of the shell; and ranging at an angle of near  $55^\circ$  above the axis of the umbonal prominence; beak occupying a position nearly over the anterior margin, rather small, and rising little above the hinge. Surface ornamented by moderately distinct, regular concentric folds, which are stronger on the most convex part of the valve, and become nearly or quite absolute around the free borders. The outer fibrous layer (which is exfoliated from the specimens examined) is, doubtless, marked also by concentric striæ.

Length, 3.45 inches; height, 2.94 inches; breadth or convexity about 0.75 inch.

This species resembles *I. Barabini* of Morton, (specimens of which are contained in the North-Western Boundary collections from Sucia Island in the Gulf of Georgia.) It differs, however, in being more compressed than the corresponding valve of that species. It is also much less regularly rounded posteriorly, and the curve of its concentric folds is different. It may be distinguished from *I. Vancouverensis* of Shumard, by having its beak very much less gibbous, and less prominent.

*Locality.* Komooks, eastern shore of Vancouver Island.

*DOSINIA? TENUIS*.—Shell circular, or very slightly oval, extremely thin, and much compressed; lateral and basal margins regularly rounded, and very thin and sharp; beaks small, compressed, central, and projecting little above the dorsal margin; lunule small and rather deep; surface marked by fine concentric striæ.

Length and height each 1.26 inches; convexity about, 0.22 inch.

As neither the hinge, nor the interior of this species has been seen, it is only referred provisionally to the genus *Dosinia*. It has much the appearance of a *Lucina*, but casts of the anterior muscular scar visible on some specimens, show these impressions to differ from those of *Lucina*. It seems to be closely allied to *Dosinia lenticularis* (*Artemis lenticularis*) of Forbes, from the Cretaceous at Pondicherry, Southern India, (Trans. Geol. Soc. Lond. vol. vii. pl. 18, fig. 7.)

*Locality.* Nanaimo, Vancouver Island.

*MACTRA GIBBSANA*.—Shell transversely oval, or subtrigonal, moderately convex, rather thin; anterior side narrowly rounded; base forming a regular semi-elliptical curve; posterior side slightly truncated at the immediate extremity, abruptly rounded or subangular at its connection with the base below; dorsal outline sloping from the beaks in front and behind, at an angle of about  $120^\circ$ ; beaks central, rather elevated, but small, and not projecting much above the

hinge margin; surface marked only by moderately distinct lines of growth. Posterior muscular impression oval, well defined; pallial line distinct, and provided with a rather deep, horizontal sinus, about one-third longer than wide.

Length, 2.04 inches; height, 1.50 inches; breadth or convexity, 1 inch.

Mr. Conrad has described a *Maetra* similar to this, under the name of *M. albarea*, from the Tertiary rocks on the Columbia River. (Am. Jour. Sci. vol. 5, sec. ser. p. 434.) The species before me, however, is proportionally longer transversely, and less gibbous. It also differs in being destitute of a distinct angle down the posterior umbonal slopes.

The specific name is given in honor of Mr. George Gibbs, the geologist of the North-Western Boundary Survey.

*Locality.* The specimens were all found in a loose piece of hard greenish gray sandstone, on the Straits of Fuca; and I have been unable to determine whether they belong to the Cretaceous or Tertiary epoch. I incline to the opinion, however, that they belong to the latter.

#### CEPHALOPODA.

*BACULITES INORNATUS.*—Shell of medium size, straight, very gradually tapering, and moderately compressed; section and aperture regularly ovate, the ventral side being a little more broadly rounded than the dorsal; lip deeply sinuous on each lateral margin, near the ventral side, and provided with a long linguiform extension on the dorsal margin, while its ventral edge presents a nearly semicircular outline. Surface entirely destitute of costæ, nodes, or undulations; lines of growth moderately distinct, and curving gracefully parallel to the prominences, and deep sinuosities of the lip.

The largest fragment of this species in the collection measures 1.49 inches in its greater diameter, and 1.13 inches in its smaller, and judging from its very gradual taper, appears to have been, when entire, as much as 15 or 16 inches in length. It differs from *B. ovatus* of Say, in being entirely destitute of undulations, at all ages, and in being usually smaller, and proportionally more slender. It also presents differences in the details of its septa, lobes and saddles, which, however, cannot be clearly explained without the use of figures.

*Locality.* Suvia Island, Gulf of Georgia.

*BACULITES OCCIDENTALIS.*—*Baculites ovatus* (Say?) Meek, 1857, Transactions Albany Inst. vol. iv. p. 48.

Shell straight, and very gradually tapering; section subtrigonal towards the larger end, but becoming more nearly ovate towards the smaller extremity; ventral side flattened, ventro-lateral margins angular; sides converging with a slightly convex outline from the ventro-lateral angles, to the very narrowly rounded, or obtusely angular dorsum; aperture subtrigonal; ventral projection of the lip nearly semicircular; that of the dorsal side much longer, somewhat wedge-shaped, but a little rounded at its narrow extremity; lateral sinuses of the lip rounded, with a long, nearly straight, oblique margin on the dorsal side. Surface ornamented with rather small, regular undulations or costæ, extending across from the ventro-lateral angles to, or beyond, the middle of each side, with a regular curve parallel with the margins of the lateral sinuses of the lip; fine regular lines of growth are also seen traversing the shell parallel to the dorsal and ventral projections, and lateral sinuosities of the lip.

The specimens examined are all too imperfect to give accurate measurements, but so far as can be determined from the taper, of those most nearly entire, an individual measuring 1.45 inches in its greater transverse diameter, and one inch in its smaller do., near the aperture, must have been about 14 to 16 inches in length.

The peculiar flattening of the ventral side of this species, is a character that will at once distinguish it from any other *Baculite* with which I am acquainted.

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This character, however, is not always so distinctly marked near the smaller extremity, as along the larger half of the shell, where it imparts to the transverse section a trigonal outline. In the form of its septa lobes, it is more nearly related to *B. compressus* of Say, than to *B. ovatus* of that author, though its form alone will readily distinguish it from either of these species.

At the time I published the paper on some Cretaceous fossils from Vancouver Island, cited at the head of this description, only a few fragments of this species were in the collection examined. Thinking the flattening of the ventral side of these probably due to accidental pressure, I referred them provisionally to *B. ovatus* of Say. At the same time, however, I suspected they might belong to a distinct species, and suggested for it, in case farther comparisons should prove it to be new, the name *B. occidentalis*, which is here adopted.

*Locality.* Komooks, eastern shore Vancouver Island.

AMMONITES COMPLEXUS var. SUCIAENSIS.—*Ammonites complexus*, Hall & Meek, 1856, Mem. Am. Acad. Arts and Sci. vol. 5, new ser. pl. 4, fig. 1, a. b.

This shell agrees almost exactly in form with *A. complexus*, excepting that it is more compressed, its volutions being distinctly narrower transversely, in proportion to their diameter from the dorsal to the ventral side, than in that species. In its septa, it agrees very closely also with *A. complexus*, the differences observable being apparently such as may be due to the larger sizes of the specimens of the form under consideration.

The largest specimen in the collection is from Sucia Island. It is an internal cast, and so much worn as to obliterate much of the details of the lobes and saddles. It consists entirely of septate whorls, the outer non-septate portion having been broken away. In its greatest diameter, it measures 4.60 inches, and 1.90 inches in breadth or thickness.

It is possible this shell may prove to be specifically distinct from *A. complexus*, but with my present means of comparison I do not feel fully warranted in separating it.

In the number, arrangement, and mode of branching of its septa lobes, as seen in some of the smaller sized specimens from Komooks, it is also very closely allied to *A. Gollevillensis*, of D'Orbigny (= *A. Lewisiensis*, D'Orb. Pal. Fr. tome 1. Cret. pl. 101, non Sowerby); though it is a more ventricose shell, and wants the dorsal groove so characteristic of that species. Its costæ also differ in being more strongly defined on the inner half of the whorls.

*Locality and position.* Sucia Island, and at Komooks on Vancouver Island.

AMMONITES VANCOUVERENSIS.—Shell discoid; volutions increasing rather gradually in size, strongly compressed on the sides, and flattened on the narrow dorsum, nearly twice as broad from the dorsal to the ventral side, as the transverse diameter,—rather deeply embracing; umbilicus of moderate depth, about half as wide as the greater diameter of the outer whorl; aperture (as inferred from a section of the outer whorl) compressed cordate. Surface ornamented by a row of compressed nodes along each dorso-lateral margin, and another of smaller size around each umbilicus; about twenty of the first, and ten of the latter, may be counted on each side of an entire turn.

The flattened sides between the dorsal and ventral rows of nodes, are provided with obscure, slightly arching, transverse costæ, one of which extends from each of the umbilical nodes towards the dorsal margin, but all become obsolete before reaching it. Between each two of these principal costæ, one or two more very obscure ones are seen, which do not reach either the dorsal or ventral margins.

The specimen from which the foregoing description was made out, consists of about the half of one volution, most of which is non-septate. When entire, the shell must have measured about 3.85 inches in its greatest diameter, and near 1.13 in breadth at the aperture. It seems to be closely allied to *A. Leopoldianus*, of D'Orbigny (Pal. Fr. Ter. Cret. t. 1, pl. 22, 23) but differs from 1861.]

D'Orbigny's figures (on pl. 23) in being more compressed near the dorsum, and in having only about half as many nodes around its dorsal and ventral margins. It also differs in having scarcely any traces of costæ near the dorso-lateral nodes (where they are strongest on D'Orbigny's figure just cited) while they are strongest near the middle of its sides.

*Locality.* Komooks, eastern shore Vancouver Island.

*NAUTILUS CAMPBELLI.*—Shell large, subglobose, or somewhat oval in form, moderately convex; dorsum and sides rounded, or very slightly compressed; volutions increasing rather gradually in size, deeply embracing within, and rounding into the umbilicus on each side; umbilicus very small, but not quite closed; septa separated by spaces less than one third the transverse diameter of the whorls at the point of measurement, and arching slightly backwards on the sides and dorsum; aperture nearly circular, but deeply sinuous on the ventral side for the reception of the inner whorls. (Siphuncle and surface markings unknown).

Length or greatest diameter, 4.83 inches; breadth or transverse diameter at the aperture, 3.07 inches.

This species is more nearly like *N. Clementinus* of D'Orbigny, (Pal. Fr. Ter. Cret. tome 1, pl. 13 bis) than any other with which I am acquainted. It differs, however, in having a more rounded aperture, and a more broadly rounded dorsum, the entire shell being less compressed.

It may be at once distinguished from *Nautilus Dekayi* of Morton, which probably also occurs in the Cretaceous beds of Vancouver's Island, by its much more compressed form, and consequently narrower aperture, as well as by its slightly open umbilicus,—that of *N. Dekayi* being entirely closed at all ages. Its whorls are likewise more compressed on the sides, and more concave in the region of the umbilicus.

The specific name of this fine *Nautilus* is given in honor of Mr. Archibald Campbell, the commissioner in charge of the North-West Boundary Survey.

*Locality,* same as last.

#### Description of New Species of Cretaceous Fossils from New Jersey, Alabama and Mississippi.

BY W. M. GABB.

The following species are described from specimens, either in the collection of the Academy of Natural Sciences, or in my own. The types are mostly in the shape of casts, but are all undoubtedly distinct. It is an unfortunate circumstance, that, except in the Ripley Group, this formation, east of the Mississippi, rarely yields the shells of the species. In fact, the study of cretaceous fossils, in this region, is to a great extent, a study of internal casts. The Pectens, Oysters, Belemnites, and some other genera, are usually exceptions to this rule; though, sometimes, we find striking instances in which the shells of other genera are beautifully preserved. The following descriptions are preliminary. Fuller descriptions and illustrations will be published hereafter.

ΑΣΤΕΡΟΝ Montf.

*A. cretacea.*—Subglobose, spire elevated, whorls five, convex (in casts) and sloping on the sides, obliquely truncated above. Body whorl sub-compressed, most convex above, width about equal to the length of the mouth. Mouth narrowed above, wide below, rounded anteriorly. Two folds on the columella; the upper one heavy and rounded, lower or anterior one, obsolete. The columellar edge of the body whorl in one of the casts is marked by acute-angular striæ, one branch extending directly upwards on the outside of the whorls (inside of the shell), and soon becoming obsolete; the other branch runs into the columellar cavity.

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Length about 1 inch (when perfect), width of body whorl .6 in.

From Crosswicks, N. J. My coll. from Dr. Slack.

Resembles *Solidula bullata nobis*, (*Tornatella id.* Morton), but is a smaller species, the spire is higher, the whorls are more flattened on the sides, and truncated above, and from a cast of the surface, we believe the exterior to be smooth, while on Morton's type, an internal cast, distinct revolving lines are visible.

*A. ovoidea*.—Elongated ovoid, spire high, number of whorls uncertain, flattened, carinate (in casts) on their upper edge. Body whorl regularly, but very gently convex. Mouth longer than the diameter of the body whorl; acuminate above, rather narrow to beyond the middle, gradually widening and rounded in advance. One large fold on the columella with a broadly rounded one, not prominent, in advance of it. From faint signs on the surface, there can be detected traces of apparently rather broad longitudinal ribs and revolving lines.

Length of body and preceding whorl 1 in., total length, perhaps, about 1.25 in. Width of body whorl, .6 in. Length of mouth, .8 in.

Found with the preceding and presented to me by my friend Dr. Slack.

These two species, with most, if not all of the New Jersey specimens here described, are from the second division of the cretaceous, following the New Jersey Geological Reports. It is the same deposit as that at the deep cut of the Delaware and Chesapeake Canal from which Dr. Morton obtained *Scaphites hippocrepis* and many other species. It seems to be the richest of the three divisions in species.

The present species can be distinguished from the preceding one by the proportionate length of the mouth and narrowness of the body whorl, and the acute upper edge of the whorl. The difference in the columella folds cannot be satisfactorily pointed out without a figure.

#### GLOBICONCHA d'Orb.

*G. curta*.—Subglobose, spire exsert, but short, nearly equal in height to the length of the mouth. Whorls four (or five?), rounded. Body whorl tumid. Mouth acuminate above, broadly rounded below. Surface? (a cast.)

Length, .75 in. Width of body whorl, .6 in. Length of mouth, .45.

A cast from the cretaceous limestone of Comanche Peak, Texas, in my collection. Presented by Dr. Moore, the State geologist of that State.

This may be a short, tumid species of *Phasianella*, but these two genera approach each other so closely in some of the forms, that it is impossible to decide from a cast. It does not resemble any of the species heretofore described in this country. *P. (Globichoncha) tumida* has a high spire. *G. elevata* is still further removed. It approaches most nearly to *G. planata*, Rœm., but independent of the difference in size, the spire is proportionally much higher, the mouth is narrowed above and is produced, regularly rounded below, without having the oblique truncation upwards shown in Rœmer's figure. The body whorl is equally prominent, but is regularly rounded.

#### NATICA Adanson.

*N. infracarinata*.—Gibbous, spire low; whorls three; rapidly increasing in size, rounded, compressed above, angle of the whorl round, surface of about the same convexity as *N. abyssinis*. Lower angle of the whorl, at the edge of the umbilicus, usually strongly carinate in the casts, sometimes rather faintly. Umbilicus patulous, perspective; open probably to the extreme spire. Mouth elongate, rather narrow, broad above, and acuminate at the lower extremity. Surface of the shell in the umbilicus striate transversely to the direction of the whorls, and marked by a small revolving line. Outer surface unknown.

Height, 1.20. Width of body whorl, 1.25. Length of mouth, 1 in.

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From the same formation, in N. J., as the preceding species of *Acteon*. My Coll., and Coll. Acad.

Closely related in general form to *N. abyssinis*. The measurements are somewhat different. Dr. Mortou's type measures, Height, 1 in. Width of body whorl, 1.30 in. Length of mouth, 9 in. The most obvious difference is in the shape of the lower edge of the whorls. In *N. abyssinis* only known from casts, it is regularly rounded. In this species it is carinate. The species may prove to belong to the genus *Gyrodes* Con., on account of the wide umbilicus, apparently without a callus, and the flattened top of the whorl.

#### LUNATIA Gray.

? *L. altispira*.—Elevated subglobose. Spire rather high; whorls four, rounded, abruptly truncated or concave above. Body whorl gibbous. Mouth broad, rounded. Umbilicus (in casts) small, perforated rather deeply. No markings on the casts.

Length, .8 in. Width of body whorl, .7 in. Length of mouth, .6 in.

Found with the preceding. My Coll., Coll. Acad.

Approaches most nearly to *L. rectilabrum* = ? *L. concinna* H. & M., but can be at once distinguished by the abruptly truncated superior edge of the whorl. This character relates it to, if it will not place it in the following genus.

#### GYRODES Con.

? *G. obtusivolva*.—Shell subglobose; spire somewhat elevated; whorls three, abruptly truncated above, where they are flat or concave with the angle acute. Body whorl gibbous, sloping below. Mouth biangular above, broadly rounded below. Umbilicus narrow, deeply perforate in casts. Surface marked by close irregular oblique striae.

My Coll., from Mr. Abbott, n. g.

Length, .8 in. Width of body whorl, .8 in. Length of mouth, .55 in.

Approaches in form the preceding species, but is a more robust shell, the truncations of the body whorl is much broader and more abrupt, and the surface is distinctly striate by lines of growth. The umbilicus appears broader, but this may be merely an individual character.

The genus *Gyrodes* will probably have to be extended to receive a number of forms, having all the other characters as described by Mr. Conrad, but with a narrow umbilicus.

Unfortunately, we are unable to determine positively, whether or not there was a callus in the umbilical cavity of this species. Could we determine that point, we might be able to settle the bounds of the genus.

*G. Spillmanii*.—Shell wide, spire low; whorls three, oblique on the sides, truncated above. The truncation is at times flat, sometimes concave; angle generally acute. Mouth biangular above, obliquely expanded below. Umbilicus broad, open, margin subcarinate.

Height, .7 in. Width of body whorl, .85 in. Length of mouth, .55 in.

Two specimens (casts) from the cretaceous limestone of Mississippi, in the collection of the Academy, presented by Dr. Spillman. Closely related to *Gyrodes (Natica) petrosa*, which is found in the same locality, but differs in the outer edge of the mouth being much less obliquely expanded, the surface of the whorls being much more nearly parallel with the longitudinal axis of the shell than in that species. The umbilicus is probably larger, but it expands at a much smaller angle. *G. petrosa* has much the outline of *Sigaretus*. This is nearer the usual form of the true *Naticas*.

*G. Abbotti*.—Shell subglobose, spire low, hardly elevated above the upper edge of the body whorl. Whorls three? (partly covered in the middle by matrix) rapidly increasing in size. Section of body whorl (= curve of the outer lip) nearly semicircular. Upper surface of the whorls flattened, but

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not truncated, nor carinate in the casts, marked by numerous oblique plications; surface markings unknown. Umbilicus large, dilated, merging by a rounded edge, without any carination, into the external surface. Mouth rounded, widest near the lower extremity.

Height, 1.5 in. Width of body whorl, 2 in. Length of mouth about 2.3 in.

This is probably the largest of the *Naticidae* in the American Cretaceous, east of the Mississippi. It exceeds the finest specimens of *Gyrodes* (*Natica*) *abyssinis*, I have ever seen, in size.

I am indebted for the only known specimen to my friend, Mr. C. C. Abbott, who has added many rare and valuable specimens to my collection from the N. Jersey marl beds. The specimen is from Mullica Hill, from the shell bed at the top of the hill, known to every collector at that locality.

From *G. crenata*, Con., it can be distinguished by the base of the body whorl being broadly rounded. From *G. alveata*, Con., by the smaller number of whorls to a shell twice the size of the type of that species, by the oblique plications and absence of a carina on the shoulder of the whorl.

#### TURBINOPSIS Con.

*T. depressa*.—Flattened; spire low; whorls three, rounded and rather widely separated in casts, indicating a thick shell; slightly channelled at the suture. Mouth elliptical longitudinally, acute below, the lower edge of the whorl very strongly carinate, with the cast of a revolving rib on the lower edge of the inner lip, and on the outer side of the carina are faint depressions at about an eighth of an inch apart, indicating a periodical tooth. These are faint or absent in the small specimens, but quite marked in the largest one before me. Umbilicus patulous, perspective.

Not very rare in the cretaceous at Crosswicks, N. J., and at the Delaware and Chesapeake Canal. My Collection from Dr. Slack, and Coll. Acad.

Height (of largest specimen) .85 in. Width of body whorl, 1 in. Length of mouth, .6 in.

I at first considered this genus as a synonym of *Cancellaria*. On more careful examination, I believe it to be very distinct. It seems to be more nearly related to *Ninella* of Gray. It has the same general form, but differs in the lower edge of the mouth being acute, with a revolving rib or tooth near the base on the inner lip.

*Cancellaria Alabamensis*, nobis, must be placed in this genus.

The present species can be distinguished by the extremely flattened form, the other species have remarkably high spires, compared with it.

#### TROCHUS Linn.

*T. Mortonii*.—Shell conical, spire elevated; whorls four, probably five, increasing very gradually in size obliquely flattened on the sides, and marked by very faint undulations, probably indicating longitudinal ribs on the shell; lower edge of whorls angulated, under surface nearly flat; mouth obliquely subquadrate; umbilicus?

Height, .75 in. Width of body whorl, 1 in. Height of mouth, .4 in.

From the white cretaceous limestone of Ala. Coll. Acad.

There are two specimens in the collection; one of them, with the sides of the whorls almost perfectly straight, has the trace of a small revolving rib or tooth near the inner angle of the mouth on the lower lip. It may belong to another species.

*T. Mortonii* resembles most nearly *T. Marrotianus*, d'Orb., in its general form, except that it is a shorter shell proportionally and the umbilicus is closed, or nearly so. The casts also exhibit traces of longitudinal ribs or undulations, which do not exist in the latter species.

#### ARCHITECTONICA Bolt.

*A. Abbottii*.—Discoidal, spire low; whorls four, truncated above, 1861.]

obliquely flattened on the sides; inferior angle carinate; lower surface broadly convex. Mouth obliquely subquadrate. Umbilicus of ordinary proportions and perspective. Umbilical surface of whorls rounded. Surface marked by small but well marked revolving and longitudinal depressed lines, producing a cancellated appearance.

Height, .8 in. Width of body whorl, 1.4 in. Height of mouth, .5 in. Transverse width of mouth, .65 in. (about)

My collection; locality, Mullica Hill; from Mr. Abbott. Several specimens in the Collection of the Academy from Timber Creek, N. J., with surfaces entirely obliterated. One specimen, also, in the Collection of the Academy, seems, from its lithological character, to have come from the white limestone of Prairie Bluff, Ala.

This shell is of the general form of *Pleurotomaria perspectiva* Sow., as figured by d'Orb., Pal. Fr. vol. 2, pl. 186, but is always smaller, not as high proportionally; the lower angle of the body whorl is more acute, and the markings are different.

From *A. crotaloides* (*Cirrus id.* Morton, *Pleurotomaria id.* d'Orb, Auct.) it can be distinguished by the higher spire, and flattened, angular whorls. The surface markings of the latter species are entirely unknown.

#### FASCIOLARIA Lam.

*F. Slackii*.—Elongated fusiform; spire turreted, about as high as the mouth. Whorls five? (the upper one is broken off, but from the width of the spire at that point, there must have been at least one volution in addition to the four in the specimen.) Upper whorls prominent in the middle, sloping gently upwards to the upper edge, which is so flattened as to indicate that the suture must have been plain, not impressed, body whorl sloping from the broad rounded shoulder, gently into a long, somewhat broad canal. Mouth acute above, rapidly widening for a short distance and then gradually narrowing. Surface marked by numerous undulating longitudinal ribs, passing straight down or obliquely backwards from the suture to the shoulder of the whorl, on which they change their direction, being inclined forwards and downwards with a regular curve, losing themselves in the general surface, or extending to the end of the canal. One very distinct, oblique rib on the middle of the columella.

Length of the specimen, containing four whorls, 1.2 in. Width of body whorl, .6 in. Length of mouth, .7 in., (perhaps, when perfect, .75 or .8 in.)

Found with the two species of *Actæon*, described above. My collection, from Dr. Slack.

Resembles in form, *Fusus exilis* Con., (Median Tert. pl. 49, f. 4,) from the Miocene, but is smaller, the shoulder of the whorls is somewhat more strongly marked, and the ribs are closer together than those of the costate variety of that species.

#### VOLUTA Linn.

*V. (Fasciolaria?) Delawarensis*.—Low fusiform; spire slightly elevated; whorls five, flattened and sloping above, marked on the angle by obtuse tubercles, twelve on the body whorl, which extend in the shape of rounded ribs, or mere undulations, about half the length of the whorl, losing themselves in the surface. Mouth subangular above; upper inner edge at nearly a right angle to the inner lip; outer lip, at first gently curved outwardly, and afterwards gradually approaching the anterior end with nearly a straight line. The greatest width of the mouth appears to have equalled about a third of its length. One heavy oblique fold on the columella.

From the Delaware and Chesapeake Canal. Coll. Acad.

This species is described from three casts in the Collection of the Academy. They exhibit traces of the lines of growth, and of small regular revolving ribs.

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There may have been another fold on the columella, but, from the condition of the specimens, I could not decide certainly. From the imperfect condition of the specimens of this magnificent species, I could not determine positively in which of the two above genera to place it. Its general form seems to relate it most nearly to the *Athleta* group of the Volutes.

Length, (broken) 2.75 in. Width of body whorl, 2.2 in. Length of mouth, (broken) 2.25 in.

*V. Kanei*.—Shell small, fusiform. Spire elevated; whorls 3—3½, rounded. Body whorl broadly rounded above, tapering below. Mouth elongate, acute above, slightly widened in the middle and narrowed below. Columella with two small oblique folds, the posterior one almost linear. Surface of casts perfectly smooth; but on casts of the surface, I have found impressions of a few rather prominent longitudinal ribs, crossed by numerous distinct revolving lines. I have not ascertained how far these extend over the surface, having traced them only on the upper third of the whorls.

Length, somewhat broken 1.1, probably 1.25 or 1.3. Width of body whorl, .55. Length of mouth, .7, perhaps when perfect, .75 or .8 in.

From N. J. My Coll., named after Mr. Chas. Kane of N. J., an enthusiastic and able collector, and one to whom I am indebted for some valuable additions to my collection.

This species resembles most nearly *V. bella*, nobis, but is a shorter and more robust shell, with the upper volutions diminishing more rapidly in size.

*V. mucronata*.—Shell turritid. Spire high; whorls four or five, rounded and increasing very gradually in size. Aperture elongate, narrow, acuminate above. Columella with three small folds, the anterior, largest; other two linear. Surface marked by broad longitudinal ribs and small distinct revolving lines.

Length of most perfect specimen (three last whorls), 1.3 in. Width of body whorls .55 in. Length of mouth about .75 in. (imperfect). Two casts in my collection; locality Crosswicks, N. J., from Dr. Slack. Of the same type as *V. Texana* and *V. nasuta*, this species differs from both in the much more gradual increase in size of the whorls, there more rounded form and the shorter mouth. This character will serve to separate it without doubt from the latter, and the additional character of the very few and delicate columella folds renders the distinction from the former certain, independently of the great difference in shape.

#### TEREDO Linn.

##### *S. G. Uperotis* Guett. ?

*T. contorta*.—Tube short, knotted, increasing rapidly and irregularly in size, and bent at two right angles in the only specimen I have seen. Shell gibbous, beaks incurved; umbones prominent, in cast, and marked by a deep angular groove, extending to the margin and inclined a little anteriorly. Anterior basal margin excavated by a deep angular notch, occupying about half the longitudinal diameter of the shell, and joining the basal margin by a short curve at or near the point where the umbonal groove reaches the edge. The extreme anterior end is buried in the matrix, but, from the direction of the surface lines, is probably acuminate. Posterior end produced rounded and slightly gaping. Surface marked by fine lines at the anterior end, which extend posteriorly, and end abruptly in a line with the posterior edge of the emargination. From this line extends a series of much finer lines running transversely with the direction of the first, being parallel with the edge of the emargination, and abruptly curving posteriorly, immediately in advance of the umbonal groove, across which are larger and less numerous lines, these again became smaller, being about as large, but less distinct than the most anterior set, and run parallel with the basal and posterior margins.

1861.]

One specimen in my collection, from Burlington Co., N. J.

Total length of tube about 1.75 in. Greatest diameter .5 in. Length of shell about .25 in. Width about 3 in.

The surface markings are about exactly like those of *Xylophaga Stimpsonii* M. & H., but the beaks are more prominent and the crenulations along the vertical furrow, extending from the beak, are much finer and more numerous. It is less oval in form than *Pholas (Xylophaga) elegantula* M. & H. The gaping appearance of the posterior end may be due to the peculiar position of the shell in the matrix. If it should prove to be closed, the species will belong to the genus *Xylophaga*.

#### PHOLAS Linn.

*P. cretacea*? *Gabb.*—*Jour. Acad.* 2d s. vol. 4, p. 393, pl. 68, f. 18.

Shell broadly cuneate, beaks very much incurved. Umbones broad; buccal extremity rather abrupt, convex. Cardinal margin rounded, sloping downwards towards the anal end, which is rather broad. Basal margin nearly straight, perhaps a little emarginate. Surface marked by a deep groove extending a little obliquely backwards from the beaks to the basal edge. In advance of this are curved striæ, very distinct and parallel, or nearly so, with the margin, which, immediately on crossing the groove, become straight. From a very small fragment of the shells attached to the cast, we find that between these grooves are small sharp ridges.

Length .21 in. Width .32 in. Diameter .2 in.

This small shell, of which I have seen but one specimen, is referred provisionally to the above species, described only from the tubes, because it is of about the proper size to form such tubes, is found in the same deposit, and is the only species known in the New Jersey deposits, except *P. cithara* Morton, which is about an inch in length. The specimen is from Burlington county, and is in my collection. It is so injured by pyrites, that I cannot ascertain how far the lines, described above, extend posteriorly. They seem, however, to continue parallel with the edge. The shell is less truncated in advance than *P. cithara*, the type of which is in the Academy's collection. The figure given by Dr. Morton is scarcely recognizable. In his specimen the posterior extremity is very narrow and the anterior end is very abruptly truncated, and not produced as in the figure. Mr. Conrad's figure of the same species, under the name of *P. pectorosa*, in the *Journal of the Academy*, 2d s. vol. 2, pl. 2, fig. 9, will convey a better idea of the species.

#### ANATINA Lam.

*A. elliptica*.—Shell subelliptical, equivalve, nearly equilateral; beaks central, pointing posteriorly, very small, umbones small. Cardinal margin slightly convex. Buccal margin broad, nearly straight and sloping inwards towards the basal edge, which is very broadly rounded, being nearly straight just opposite the beaks. Anal extremity hardly more than half as broad as the buccal, and with the hinge line between it and the beaks, regularly concave. There is a broadly rounded ridge extending from the umbones towards the anterior basal margin, gradually becoming obsolete as it approaches the edge. Shell thin, and marked on the surface by small, irregular concentric ridges.

Length .9 in. (from beaks to basal margin). Width 1.3 in.

Locality, Mullica Hill, N. J., collected, with a number of other fine specimens, by Messrs. Abbott and Kain.

#### VENILIA Morton.

*V. trigona*.—Shell very oblique. Beaks very prominent, anterior, almost terminal, incurved, umbones small, umbonal ridge prominent, subangular slightly rounded on the edge, and extending to the extreme posterior basal angle of the shell. Basal margin nearly straight on the posterior half, regu-

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larly rounded from the middle to the anterior extremity of the hinge line. Anal margin, lower third, at about a right angle to the basal edge, upper portion curved as it passes the muscular scars, and straight, inclined anteriorly beyond, until it reaches the hinge line. Hinges composed of the characteristic teeth, but very robust. Anterior muscular scars very deep, posterior, hardly visible.

Length 1·6 in. Width 1·9. Transverse diameter 1·5 in.

Locality, Boonton, N. J. My collection, from Mr. Abbott.

There is a specimen in the collection of the Academy, apparently belonging to this species. Both are casts. The Academy's specimen, however, has a lithological character, entirely unknown to me, in the Cretaceous. It is from a light grey calcareous clay rock. I have been unable to see the impression of the hinge in that specimen. Mine shows the impressions of all of the cardinal teeth perfectly. There can be no doubt of the difference between this genus and *Cyprina*, to which it was referred by d'Orbigny. Dr. Morton's figure of the hinge (Synopsis, pl. 8) is correct for the right valve. That of the left valve is totally wrong. An examination of the figure will suffice to show that the two valves, as there represented, would not articulate. I have before me a drawing, which I made from the original specimen, in the collection of the Academy. Anteriorly, there is a large, flattened tooth, arising gradually in advance and ending abruptly, which articulated with the fosset, in advance of the two small, round teeth in the right valve. These, in turn, correspond to two small fossets on the left side. Behind these fossets there is a large, triangular pyramidal tooth, matching the fosset in the right valve (not well represented) between the two small and the long, narrow cardinal teeth; the latter is received in the left valve, between the pyramidal tooth and a corresponding tooth. There is also a long, lamellar, lateral tooth, placed posteriorly, but represented too near the edge in the figure of the left valve. The two figures in Dr. Morton's illustration were apparently taken from the right valve.

The present species is the most abrupt yet described. It is nearest *V. Conradi*, but differs in being higher, the beaks even more anterior; the basal margin straighter, the posterior edge by far less prominent and the transverse diameter proportionally much greater. From the cast, the surface does not seem to have possessed varices. It resembles, on its posterior face, some of the forms of *Cucullæa vulgaris*, but can be distinguished from that species by wanting the internal plates, and by the hinge being composed of a few very robust teeth.

#### ARCA Lam.

*A. altirostris*.—Small, robust, elongated, subquadrate. Beaks a little in advance of the centre, very prominent, distant and somewhat incurved. Basal margin regularly convex, posterior edge nearly straight, and most prominent at its lower portion. Surface markings unknown, a faint umbonal ridge extending from the beaks to the margin. Muscular scars distinct, but not prominent, posterior ones largest and most regular in shape. Pallial impression well marked. Hinge line curved on its inner margin.

Length, ·55 in. Width, ·65 in. Diameter, ·4 in.

Of nearly the same size as *Cibota multiradiata*, nobis, this species can be distinguished by the very prominent beaks, and less regularly gibbous form. The margin, which, in that species, is crenulated, does not seem to be in this, from an examination of the cast. The basal margin is closed in this species, and gaping in that.

It is more nearly related to *A. quindecimradiata*, but is much smaller, the beaks are much more prominent, proportionally, and it wants the distinct radiating lines, plainly visible on the casts of that species.

Locality, Crosswicks, N. J. My collection, from Dr. Slack.

## CUCULLÆA Lam.

*C. vulgaris* Morton.—Synopsis, p. 64, pl. 3, fig. 8, and pl. 13, f. 5.

Under this name have been confounded several species, found in New Jersey. Having the good fortune to have access to Dr. Morton's types, I shall endeavor to separate them, a task which would be almost impossible, with only the meagre description and worse figures, given in the synopsis. The true *C. vulgaris* is characterized as follows:—

Shell gibbous, sub-triangular. Beaks anterior, prominent, remote. Hinge line short, straight externally, internally curved; teeth? Buccal margin broadly rounded, basal nearly straight; posterior angle produced. Umbonal ridge prominent, subangular; umbonal slopes almost at a right angle with the rest of the surface. Surface marked by distinct, irregular, concentric lines. Area impressed and marked by five or six angular lines. Muscular scars rather small. Pallial line very distinct.

The most obvious distinguishing characters of this species are the prominent, remote beaks, placed almost at the anterior extremity.

There is another form found with this, probably a variety, in which the umbonal ridge, instead of being straight, as in the typical specimens, is distinctly convex in the middle.

*C. neglecta*.—Shell subquadrate, more compressed than the preceding species. Beaks small, incurved, placed near each other, and almost one-third of the distance from the anterior end. Buccal extremity prominent, rounded. Anal margin nearly parallel with the buccal, and much less produced than in *C. vulgaris*. Basal margin broadly and pretty regularly convex. Area small, narrow. Internal plate long and narrow. Surface marked by numerous, rather small, radiating lines.

Length, 1 in. Width, 1.3 in. Diameter, .8 in.

Found abundantly with the preceding. I have only seen casts.

This species approaches most nearly *C. Mailleana* (*Arca id.* d'Orb.,) but is much less ventricose, and the beaks are not half the distance apart. There is little or no resemblance between it and *C. vulgaris*.

*C. transversa*.—Shell very gibbous. Beaks large, prominent and very far apart, placed about a third of the distance from the buccal end. Area broad and very long. Posterior-basal angle prominent. Internal plate low and broad. Hinge nearly straight. Surface marked by numerous radiating lines.

Length, 1.4 in. Width, 1.8 in. Transverse diameter, 1.5 in.

One specimen in the collection of the Academy, presented by Mr. Harris, probably from Arneytown, N. J.

From the preceding species, this can be distinguished by the much deeper valves, more remote and prominent beaks and long hinge area. It is the most convex species in New Jersey, being more so, in proportion to its size, than *C. antrosa* Morton. The form will distinguish it from that species. It resembles somewhat *C. fibrosa* Lam., but is more convex on the basal margin, the beaks are larger and more remote, and the whole shell is somewhat more oblique. The hinge is longer than that species, as is also the width of the shell from buccal to anal margins. From *Arca quindecemradiata*, it can be distinguished by having probably twice the number of ribs, and by being more convex.

LITHOPHAGUS Muhlf. 1811.

*Lithodomas* Cuv. 1817.

*L. Ripleyanus*.—Tube subcylindrical, nearly straight, gradually tapering, broadest on the dorsal surface; opposite face narrow, rounded; extremity abrupt, rounded and faintly sub-trilobate. Shell subquadrate. Beaks terminal, and projecting beyond the buccal end of the shell, very much incurved, so as to appear somewhat spiral. Umbones broad, slightly flattened in the middle. Cardinal margin straight anteriorly, depressed posteriorly, merging

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into the anal border, which is subtruncate and most prominent above. Basal edge broadly emarginate. Surface marked by numerous, irregular, concentric lines.

Length, .25 in. Width, .55 in. Diameter, .35 in.

Length of tube, .9 in.

Not rare in the marls of New Jersey. I found one specimen, somewhat smaller than the above measurements, at the point where the West Jersey railroad crosses Big Timber Creek, between Gloucester and Red Bank, N. J., showing the shell, beautifully preserved. It is from the bed usually known as the "Ripley Group," discovered almost simultaneously in Mississippi, by Dr. Spillman, and Prof. Hilgard, the State geologist, and first recognized by me in New Jersey.

The shell resembles *L. Australis nobis* (*Lithodomus id.*, Synopsis Moll. of Cret., *Modiola id.*, Proc. Acad., 1860,) but is narrower, posteriorly, and the cardinal margin is more depressed.

*L. affinis*.—Tube robust, curved, short. Portion containing the shell broad, grooved at the anterior half of the back, rounded carinate the rest of its length. Opposite face more narrow and deeply grooved. Extremity distinctly trilobate. Shell unknown. From the shape of the tube, it appears related to the preceding species, but the beaks are less prominent in advance, the shell is much more gibbous, the basal margin more emarginate, and the posterior cardinal margin more depressed.

Length of tube (extending a little beyond the shell) .6 in. Width (in the direction of the length of the shell) .35 in. Transverse width .4 in.

From the green marl of New Jersey. Exact locality unknown, probably Burlington county. Coll. Acad.

Although I have only seen the tube of this species, I do not hesitate in describing it. It is shorter, more robust and more distinctly marked by the form of the shell, than that of the preceding species, and is somewhat curved, a character I have never seen in *L. Ripleyanus*, after examining more than twenty specimens. The marks on the surface of the tube indicate a much shorter and more robust shell.

#### CTENOIDES Klein, 1753.

*Radula* Klein, 1753; *Lima* Brug., 1792.

*C. denticulicosta*.—Shell oblique, inflated, thin; ears small. Surface marked by about twenty-eight angular ribs strongly creulated on the crest, and occasionally with faint traces of supplementary ribs on their sides. Interspaces between the ribs angular, marked by strong lines of growth, which are more evident at the sides of the shell, at which points the ribs become smaller, and finally disappear, thus leaving about one-sixth of the surface at each side without ribs. Interior marked by grooves corresponding with the ribs on the surface.

Length, .75 in. Greatest width, .65 in. Depth of valve, .3 in.

From the Cretaceous of Tennessee. My Coll. and Coll. Acad. From Prof. Safford, the State Geologist of that State.

This shell resembles *C. reticulata* nob. (*Lima id.* Lyell & Forbes,) but is a little more rounded, especially on the posterior side. It can be distinguished, however, by the ribs being larger, fewer in number, and strongly crenulate, as well as from the fact that, at both the anterior and posterior sides, the ribs disappear for about one-sixth the width of the shell. The umbones are somewhat smaller than in *C. reticulata*. From *C. crenulicosta*, it can be distinguished by the shape, being much more elongate, ribs smaller and more numerous, and in the latter species the whole surface is costate.

#### PECTEN Linn.

*P. tenuitesta*.—Shell thin, orbicular, flattened; valves of about equal  
1861.]

convexity. Ears unknown. Surface marked by about forty slender, rounded ribs of variable size, often showing a marked tendency to alternation of large and small ones. Interspaces between the ribs flat, and equal to, and sometimes wider, than the ribs. The surface, both of ribs and interspaces, is covered by very fine concentric lines placed close together, often hardly visible to the naked eye, and sometimes assuming the form of comparatively large imbrications. Interior of the shell marked by grooves corresponding with the external ribs.

This species occurs occasionally in the dark-blue marls of Burlington and adjoining counties, but I have never seen a whole shell. It seems to be of the form and size of *P. Burlingtonensis* nobis, but is sufficiently distinguished by the radiating ribs. The valves are about half an inch apart in the middle.

*P. asper* Lam.—There are two specimens of this species, in the Academy's Collection, among the American specimens. One purports to have come from Tennessee, the other is without a label. They may both be, however, European specimens, placed there by mistake. I mention the fact to call the attention of collectors to the matter.

#### OSTREA Linn.

*O. pandaformis*.—Subquadrate. Lower valve very convex, nearly pyramidal, most prominent in the centre, from which point the sides slope abruptly, the anterior half forming nearly a right angle with the line running from the beak to the crest. Laterally, the slope is not so great. Upper valve flat, for the first third of its length, then convexly curved downwards, the anterior half becoming deeply concave in the middle.

Holding the shell so that the beaks arc furthest off, the right hand side is entire; the left side is emarginate towards the basal margin. Surface strongly imbricated, the surfaces of the layers being smooth; no costæ visible on the surface.

Length, 3 in. Width, 2.5 in. Greatest depth, 2 in.

Locality, "seven miles below Yazoo, Mississippi." My collection. From Dr. Janeway, U. S. A. Most probably cretaceous.

The irregular form of this shell makes it exceedingly difficult to describe. It resembles, remotely, some of the more regular forms of *O. panda* Morton, but can be distinguished by its much greater size, the deeper inferior valve, the entire absence of ribs, and the strongly imbricated surface. The growth of the shell has been a little oblique, making the striae, especially of the upper valve, somewhat excentric. It wants entirely, however, the spiral form of *Exogyra*.

*O. cretacea* Morton.—Syn., p. 52, pl. 19, f. 3.

This species, described and figured from a specimen from the Eocene limestone of South Carolina, is said by Dr. Morton to occur in the "older cretaceous strata of Greene county, Alabama," and has been frequently quoted from other cretaceous localities. I have seen but one or two valves, of the so-called *O. cretacea*, from the cretaceous formation, and I consider them distinct. It is more oblique, and is usually somewhat curved. One specimen, found by myself at Mullica Hill, is quite thick, and resembles more nearly *O. robusta*. The true *O. cretacea* is nearly equilateral and sub-ovoid.

*O. panda* Morton.—Syn. p. 51, pl. 3, fig. 6, exclus. pl. 19, fig. 10.

Dr. Morton also described two species under this name. I have before me full series of both. The cretaceous form, the one to which the name will have to apply, is, without exception, the most irregular oyster I have ever seen. It varies from crescentic to obliquely ovoid, subquadrate, oval or almost circular, and is marked by from two or three undulations or contortions to nearly twenty radiating ribs, which are sometimes smooth, and at others coarsely imbricated. The lower valve is usually attached, but, when free, is

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flat for a half or two-thirds of its length, and is then bent upwards at various angles, often nearly a right angle. The line at which the two valves meet is well defined. Hinge short, rounded, triangular, not very marked.

The shell is usually about an inch long. I have never seen one more than an inch and a half in length. Prof. Safford, State Geologist of Tennessee, sent me numerous species, from the "Ripley Group" of that State.

I shall name the Eocene species, in honor of Dr. Morton,

*O. Mortonii* G., *O. panda* M. pars. Syn. pl. 10, fig. 10.

Shell oblique, triangular to subquadrate. Both valves strongly plicated. Lower valve, especially in young specimens, usually convex, deepest in the middle, but rarely bent abruptly, and then usually from having been encrusting. Hinge distinct, very oblique, and nearly as high as wide, with a distinct, medial depression. Placing the lower valve in its natural position, with the beak furthest off, the left basal angle is always most produced, the right side from the hinge to this angle being more or less regularly curved, and the left side nearly or quite straight. Surface marked by a slightly variable number of ribs, usually about eleven, one or two of which are often much larger than the others; the longest side being without ribs, except in very large specimens, when there will sometimes be found a dozen small supplementary ones. Upper valve nearly or quite flat, and always plicated as strongly as the lower ones, and in a corresponding manner. As the shell increases in size, the form and markings become less regular, sometimes the plications equalling in depth one-third of the length of the shell.

Dr. Morton's figure is a very accurate representative of the original, now before me. Another specimen from the same bed is 2.5 in. long. Width, 3 in. Diameter, 1.5 in. Greatest oblique width, 3.5 in.

Very common in the Eocene limestone of South Carolina, and in the same formation from Alabama.

*Ostrea Vicksburgensis* Cuv., can be distinguished from this species by its more regular form, deeper valves, and smooth, rounded ribs.

#### GRYPHÆA Lam.

*G. Thirsæ*.—Rounded-subtriangular. Lower valve; beak very small, and close to the hinge, never exert. Umbone rounded, very prominent and somewhat compressed laterally, the rounded elevation continuing more or less regularly, becoming broader, to the middle of the basal margin, at which point this margin is always somewhat emarginate. Ligament area broad, triangular, transversely striate, and with a slight, irregular depression in the middle. Interior of valve very deep. Muscular impression nearly ovoid, narrowest on the inner end. External surface marked by a few small, irregular squamose ridges, most numerous and distinct directly behind the emargination of the base. Upper valve unknown.

The species resembles, remotely, some of the narrower forms of *G. vesicularis* Lam., but after comparing the series before me with numerous authentic specimens of that species, both American and European, some of the latter labelled by d'Orbigny and others, by Charlesworth, I am satisfied that they are distinct. The beak is so small as to be almost obsolete, and there is always a more or less distinct, rounded, umbonal ridge. In general form, it resembles *G. (Exogyra) columba*, but wants the spiral beak, and is never lobed. The small beak and absence of all traces of lobes will sufficiently separate it from *G. Pitcheri*.

The specimens are in the Museum of the Smithsonian Institute (No. 570), and are from a light gray sandy marl.

Locality, "Nanafalia," Alabama.

Length, 1.7 in. Greatest width, 1.3 in. Width at the hinge, .6 in. Greatest height of valve, .8 in. Height at the hinge, .7 in. Length from the basal margin, over the umbone, to the beak, 2.3 in.

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The measurements above were all taken from one specimen; they vary a little, but the shape and proportions are very nearly alike in all the specimens I have seen.

## AMORPHOZOA.

## EUDEA Lam.

?*E. dichotoma*.—Subcylindrical, often compressed or irregularly nodulated; dichotomous, flattened below each dichotomization; rarely approaching a massive form. Internal tube generally obliterated, but wide and distinct in one instance. Surface covered by numerous rounded pores placed close together, and a few large rounded, scattered depressions, probably representing the "*oscules*" described by Pickett.

Common in the dark green marl of the second division of the Cretaceous, of the New Jersey Geologists. I found it abundantly in the marl pits of Hon. Nathan Stratton, near Mullica Hill, and in the same beds at Blackwoodstown, N. J.

The branches are rarely found in pieces of more than an inch and a half in length, are usually from a third to a half an inch thick, and are frequently dichotomous, though I have only in one instance found a mass of more than half a cubic inch in size. The surface is usually entirely destroyed, so that the form alone distinguishes them from accidental concretions. The discovery of undoubted pores in several specimens, however, indicate their organic origin, though I can only place it doubtfully in the above genus.

Catalogue of land and fresh water univalve MOLLUSKS collected in British America by Messrs. Ross, Kennicott and Drexler, and deposited in the Smithsonian Collection.

BY W. G. BINNEY.

*From English River.*

- Helix arborea* Say.  
*chersina* Say.  
*striatella* Anthony.  
*Bulimus harpa* Say.  
*Achatina lubrica* Müll.  
*Limnæa jugularis* Say.  
*appressa* Say.  
*ampla* Michels.  
*palustris* Lin.  
*Physa heterostropha* Say.  
*hypnorum* Lin.  
*Planorbis trivolvis* Say.

*From Ft. Simpson, on Mackenzie's River.*

- Succinea avara* Say.  
*lineata* W. G. B. ?  
*Limnæa appressa* Say.  
*palustris* Lin.  
*Planorbis trivolvis* Say.  
*parvus* Say.

*From Fort Resolution, Slave Lake.*

- Succinea Haydeni* W. G. B., var. minor.  
*Physa hypnorum* Lin.

*From Hudson's Bay.*

- Limnæa appressa* Say.  
*palustris* Lin.  
*caperata* Say ?

*From James' Bay.*

- Succinea ovalis* Gld., non Say ?  
*Bulimus harpa* Say.  
*Physa* ——— ?  
*Planorbis armigerus* Say.

*From Moose Fort.*

- Limnæa* ——— n. sp. ?

*From Moose Factory.*

- Vitrina limpida* Gld.  
*Succinea ovalis* Gld. non Say.  
*obliqua* Say.  
*Helix arborea* Say.  
*striatella* Anthony.  
*labyrinthica* Say.  
*monodon* Rackett.  
*young* albolabris or thyroides.  
*Achatina lubrica* Müll.  
*Limnæa palustris* Lin.  
*appressa* Say.  
*Physa heterostropha* Say.  
*Planorbis bicarinatus* Say.  
*parvus* Say.  
*Amnicola lustrica* Say.  
*porata* Say.  
*limosa* Say.  
*Valvata tricarinata* Say.

## Notes on the Terrestrial Mollusks of the Peninsula of California.

BY W. G. BINNEY.

Our knowledge of the air-breathing mollusks of Lower California is derived almost entirely from the labors of Mr. John Xantus. The specimens collected by him, and from which the following descriptions are drawn, are deposited in the collection of the Smithsonian Institution.

The South American type of *Bulimus* appears to prevail, while the presence of undoubted specimens of *B. proteus* and *pallidior* is an interesting fact in the study of geographical distribution.

*HELIX AREOLATA* Sowb. Cerros Island. (Dr. Veatch.)

*HELIX PANDORÆ* Forbes. Margarita Island. (My cabinet.) San Juan? (Forbes.)

*BULIMUS EXCELSUS* Gould. La Paz. (California Acad. Nat. Sc. coll.)

*BULIMUS VESICALIS* Gould. Lower California. (Gould.)

*BULIMUS PALLIDIOR* Sowb. (*B. vegetus* Gould.)—Mr. Xantus found it at Cape San Lucas and 350 miles above. For an account of its habits see that of *B. inscendens* described below. It appears to inhabit the whole peninsula, as Carpenter quotes it from San Diego, and Gould at San Juan. It is found in very great quantities. Sowerby is undoubtedly wrong in giving "South Sea Islands" as locality. Pfeiffer gives S. America on Cumings' authority.

*BULIMUS PROTEUS* Brod. Cape San Lucas. (Xantus.)—One large specimen agreeing with the figure of Deshayes and Ferussac, pl. 139, figs. 1 and 2, and numerous immature ones, were collected by Mr. Xantus. The colored bands are longitudinal and not transverse as in Reeves' fig. 100, Con. Icon., which is also 8 mill. longer than Mr. Xantus' largest specimen. *B. proteus* is referred to the mountains of Peru by Pfeiffer.

*BULIMUS XANTUSI*, n. s.—*T. rimata*; oblongo-ovata; calcarea; striis creberrimis flexuosis longitudinalibus et lineis minutis intercidentibus notata; sutura impressa; anfr.  $5\frac{1}{2}$  convexi, ultimus 5-7 long. testæ æquans; columella arcuata; apertura obliqua, ovalis; perist. simplex, acutum, marginibus approximatis, columellari reflexo; paries aperturalis callo tenui induta. Long. mill. 21, lat. 8. Ap. 10 longa, 6 lata.

Habitat promont. San Lucas, pæninsulæ Californiæ. Exempla 4 collegit J. Xantus.

Shell rimate, oblong-ovate; chalky-white; marked with numerous longitudinal wavy striæ and decussating minute revolving lines; suture impressed; whorls  $5\frac{1}{2}$ , convex, the last 5-7ths the length of the shell; columella arched; aperture oblique, oval; perist. simple, sharp, its ends somewhat approaching, that of the columella reflected; the parietal wall of the aperture covered with a light callus.

The four specimens collected are very uniform in outline, size and markings. The peculiar wavy striæ and minute revolving lines are its chief characteristics.

*BULIMUS ARTEMISIA*, n. s.—*T. rimata*; subcylindrica, versus apicem obtusam, distinctè lirata attenuata; tenuis, diaphana, læviuscula, longitudinaliter vix rugosa; sutura impressa; anfr. 8, leviusculi, regulariter accrescentes, ultimus  $\frac{1}{2}$  long. testæ æquans; apertura obliqua, ovalis; perist. simplex, vix incrassatum, marginibus approximatis, callo crasso, exstante junctis, columellari dilatato.—Long. 23, diam. 6; ap. 7 long, 5 mill. lata.

Habitat ad promont. San Lucas, pæninsulæ Californiæ, in Artemisia degens. (J. Xantus.)

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Shell rimate, subcylindrical, broadest at the second whorl, from which it gradually tapers towards the apex, which is obtuse, its first whorl and a half being bulbous, and marked by numerous strong longitudinal ribs; white; nearly transparent; the longitudinal wrinkles of growth scarcely roughening the almost smooth surface; suture distinct; whorls 8, flattened, regularly and gradually increasing, the last equalling one-half the whole length of the shell; aperture oblique, oval; peristome simple, hardly thickened, its terminations approached, and made continuous by a white, upright callus, the columellar portion expanded.

But one specimen was found on a small species of *Artemisia* at Cape San Lucas, Lower California by Mr. J. Xantus, and is preserved in the collection of the Smithsonian Institution.



*BULIMUS PILULA*, n. s.—T. umbilicata, globosa, inflata; tenuis; longitudinaliter rugosa; calcarea; apex obtusa; anfr. 4 convexi, ultimus inflatus, long. testæ 10-11 æquans; columella simplex, arcuata; apertura obliqua, rotundata; perist. simplex, acutum, margine columellari dilatato. Long. mill. 22, lat. 7. Ap. 9 longa, 6 lata.

Habitat in península Californiæ, ad "Todos Santos Mission," et in insulâ "Marguerita." Saxa degens sub muscis. Specimina plurima collegit J. Xantus.

Shell globose, inflated; umbilicated; thin; with longitudinal wrinkles; chalk-colored; apex obtuse; whorls 4, convex, the last very inflated, equalling 10-11ths the length of the whole shell; columella simple, arched; aperture oblique, rounded; peristome simple, acute, its columellar end expanded so as partially to cover the umbilicus.

Mr. Xantus found many of this species during his stay on the peninsular, and is decidedly of the opinion that maturer specimens, if any existed, would have been noticed by him. It frequents rocky spots, living under mosses.

I can find no figure in Reeves' Monograph or description in Pfeiffer's works of any species at all approaching it in shape. *Bulimus sufflatus* Gould, from Lower California, of which I have seen a specimen, does not appear to be a more mature form of it. The measurements are taken from the largest individual. All the specimens are uniform in outline and other respects.



*BULIMUS INSCENDENS*, n. s.—T. rimata; acuminato-oblonga; tenuis; rufo-brunnea; striis incrementi et lineis minutis volventibus decussata, apice lirata; sutura medioeris; anfr. 7 convexi, ultimus 7-12 long. testæ æquans; apertura obliqua, oblongo-ovata, perist. simplex, acutum, ad columellam reflexum; paries aperturalis callo tenui induta. Long. mill. 36, lat. 10. Ap. 15 longa, 9 lata.

Habitat in montibus arenosis peninsulæ Californiæ inter "Cape San Lucas" et "Margarita Bay," inscendens in arbores "Copal" dictas. (J. Xantus.)

Shell rimate; acuminately oblong; thin; reddish brown; decussated with striæ of growth and minute revolving lines, the apical whorl and a half being ribbed; suture moderate; whorls 7, convex, the last 7-12ths the shell's length; aperture oblique, oblong-ovate; peristome simple, acute, reflected at the columella; a thin callus on the parietal wall of the aperture.

The description is drawn from the most perfect specimen, which is somewhat smaller and more cylindrical than some of the others. On first receiving a single specimen, I was inclined to refer it to *B. excelsus* Gld. A careful examination of the description of that species, however, and of a specimen lately received, convinces me of its being distinct. Its peculiar characteristic is the strongly ribbed, polished apical whorls, differing from the decussated sculpturing of the remainder of the shell.



It was found in great numbers with *B. pallidior* Sowb., climbing high Copaiva trees, called "Copal" by the natives, on dry mountains 800 to 1000 feet high. It was never observed on the table lands or low lands. Mr. Xantus traced it from Cape St. Lucas some 350 miles up the coast.

PEDIPES LIATA W. G. Binn. Cape San Lucas. (J. Xantus.)

### Description of two new species of HELIX.

BY A. D. BROWN.

HELIX HUBBARDI. Figs. 1 and 2, mag. 5 diams.



T. umbilicatâ, depressâ, tenui, oblique striatâ, basi striis obsolete, corneo-rufescente; laminis 4, 2 parietalibus, superâ prominente, inferâ lineari, 2 in fundo anfractus ultimi; spirâ vix elevatâ; anfr.  $4\frac{1}{2}$ —5, convexis, ultimo antice vix descendente; umbilico lato; aperturâ perobliquâ, subcircularis; perist. breviter reflexo, simplici.

Diam. maj.  $2\frac{1}{4}$ , alt.  $1\frac{1}{4}$ , mill.

Hab.—Prope Indianola, Calhoun Co., Texas. (E. W. Hubbard.)



Shell umbilicated, depressed, thin, obliquely striated, striae upon the base obsolete, brownish horn color; laminæ 4, 2 upon the parietal wall, the upper one prominent, the lower very faint, 2 deep within the last whorl; spire slightly elevated; whorls  $4\frac{1}{2}$ —5, convex, the last slightly descending; umbilicus wide; aperture very oblique, subcircular; peristome slightly reflected, simple.

Allied in shape to *H. pulchella* Mull., and in the parietal laminæ to *H. labyrinthica*, Say. From the former it differs in the presence of the laminæ, and in being striate; from the latter, in its more depressed form, wider umbilicus, finer striae, and internal laminæ.

### HELIX TRIZONALOIDES.

T. imperforatâ, globosâ, solidâ, oblique striatâ, (pallide corneâ)?, zonis 3-castaneis cingulatâ; spirâ elevatâ; anfr. 5, convexiusculis, ultimo pone labrum scrobiculato intus tuberculum formante; aperturâ perobliquâ, ovatâ, intus bidentatâ, dente altero ad marginem basalem, altero intra aperturam; perist. albo, late reflexo, umbilicum tegente.

Diam. maj. 21. min. 17, alt. 12, mill.

Hab.—Haiti?

Shell imperforate, globose, thick, obliquely striated, (pale horn color)?, encircled by three brown bands; spire elevated; whorls five, rather convex, the last furrowed behind the lip, forming a tubercle within; aperture very oblique, ovate, with two teeth, one on the basal margin, the other within the aperture; peristome white, widely reflected, covering the umbilicus.

Allied to *H. trizonalis*, Grat., and also in the peculiar arrangement of the teeth to *H. cepa*, Müll. From the former it differs, in having the umbilicus entirely closed; in the internal tubercle, which is stouter than in *trizonalis*; in the more elevated spire; in being heavier, and more coarsely striated. From *cepa*, it is readily distinguished by its more elevated spire, smaller size, and more oblique aperture.

I am in doubt as to the locality of this shell, but from the singular arrangement of the teeth, resembling both *trizonalis* and *cepa*, am disposed to refer it to Haiti.

A copy of the Proceedings for July and August was placed on the table.

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*Nov. 5th.*

Mr. LEA, President, in the Chair.

Twenty-seven members present.

The following papers were presented for publication :

Descriptions of new species of American tertiary Fossils, and of a new carboniferous Cephalopod, by Wm. M. Gabb.

A monograph of the genus *Aegiothus* with descriptions of new species, by Elliott Coues.

Note on the Bartram oak, (*Quercus heterophylla*), by S. B. Buckley.

New species of Coleoptera inhabiting the Pacific district of the United States, by John L. Le Conte, M. D.

Notes on certain Decapod Crustacea, by Wm. Stimpson.

*Nov. 12th.*

Mr. LEA, President, in the Chair.

Twenty-three members present.

The following papers were presented for publication :

Notes on Cretaceous Fossils, with descriptions of a few additional new species, by Wm. M. Gabb.

Notes on the Coleopterous Fauna of Lower California, by John L. Le Conte, M. D.

Monograph of the Polyzoa of the Secondary and Tertiary formations of North America, by Wm. M. Gabb, and George H. Horn, M. D.

New Unionidæ of the United States, by Isaac Lea.

*Nov. 19th.*

Mr. LEA, President, in the Chair.

Thirty-four members present.

The following papers were presented for publication :

Description of a new species of North American Grouse, by George Suckley, M. D., U. S. A.

Descriptions of new Birds from Western Africa in the Museum of the Academy of Natural Sciences of Philadelphia, by John Cassin.

Description of a new Mexican Bat, by Harrison Allen, M. D.

A copy of the Proceedings for September and October was placed on the table.

The following Resolution was adopted :

That the President of the Academy be requested to invite Dr. Isaac I. Hayes, commander of the late Arctic Expedition, to attend the next meeting of the Academy, and to give such information as he may consider of special interest in relation to the expedition.

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Nov. 26th.

Mr. LEA, President, in the Chair.

Ninety-one members present.

In accordance with the invitation extended at the preceding meeting, Dr. Hayes gave a narrative of the explorations of his late Arctic expedition. He made copious collections in various departments of Natural History, which, with great liberality, he placed at the disposal of the Academy, for the selection of such specimens as are desirable additions to the Museum.

On report of the respective Committees, the following papers were ordered to be published in the Journal:

Monograph of the Polyzoa of the Secondary and Tertiary formations of North America, by Wm. M. Gabb, and George H. Horn, M. D.

New Unionidæ of the United States, by Isaac Lea.

Descriptions of new Birds from Western Africa in the Museum of the Academy of Natural Sciences of Philadelphia, by John Cassin.

And the following in the Proceedings:

#### Notes on the Coleopterous Fauna of Lower California.

BY JOHN L. LE CONTE.

The Coleoptera of Lower California, thus far unknown to science, are now, by the industry of my indefatigable friend, Mr. John Xantus, capable of being duly compared with those of contiguous regions. His collections embrace (as I am informed by him) more than 500 species, of which the portions thus far sent to me contain 114. It is not my intention on the present occasion to describe the new species which have thus become known to me, but rather to await the arrival of the remainder of the collections, and then to prepare a synopsis of the fauna. In this paper I will merely call attention to the relations between the fauna of the region in question and those of California, Arizona, Mexico and Texas, describing only a few of the most conspicuous and characteristic species.

Among the 114 species which I have received, the following are found in Upper California (maritime): *Cicindela sigmoidca Lec.*; *C. hemorrhagica Lec.*; *Hydrophilus californicus Lec.*; *Temnochila chlorodia Lec.*; *Sphenophorus procerus Lec.*; *Dermestes Mannerheimii Lec.*; *D. vulpinus Linn.*

These are found in Arizona: *Saprinus fimbriatus Lec.*; *Cerenopus concolor Lec.*; *Hydrophilus limbalis Lec.*; *H. ellipticus Lec.*; *Diptotaxis angulata Lec.*; *Clerus latecinctus Lec.*; *Asclera cana Lec.*; *Dineutus sublineatus Aubé*, (♀ integer *Lec.*); *Sinoxylon asperum Lec.*; *Arhopalus curystethus Lec.*

And these in Texas and New Mexico: *Megacephala carolina Dej.*; *Casnonia pennsylvanica*; *Lebia grandis Hentz.*; *Plochionus timidus Hald.*; *Derobrachus geminatus Lec.*; *Elaphidion validum Lec.*; *Tragidion annulatum Lec.*; *Dendrobias 4-maculatus*; *Coccinella abdominalis Say*; *Acmæodera flavomarginata*; *Dermestes vulpinus Linn.*; *Euparia strigata?*; *Ligyris rufinasus Lec.*; *Ludius (Crigmus) texanus Lac.*; *Bostrichus punctipennis Lec.*; *Notoxus monodon?*; *Sitophilus oryzae*; *Hydrophilus triangularis Say*; *Polycaon exesus Lec.*; *Calosoma scutator Fabr.*

Of the remaining species nearly all appear to be new; the genera are those already known in our territory, with the exception of one species of *Megasoma*, several species (perhaps five) of *Breathus*, allied to the common Mexican species, and three *Cerambycidae* of unknown genera.

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A very few are closely allied to, and perhaps identical with described Mexican species, but the number is very small.

Some of the more conspicuous and peculiar species are described below: enough has been stated to show that the affinities of the fauna are with that of the region extending from the Colorado Desert across to the Rio Grande valley, thereby confirming the results obtained\* by Prof. Baird and Mr. Cope† from the study of the vertebrata collected by Mr. Xantus.

The limited number of species of those two classes precludes the possibility of the occurrence of many new forms in the region here treated of; but in the number of peculiar species of the much more extensive class of insects seen in Mr. Xantus' collections, we recognize that Lower California constitutes one or more provinces of the Interior district, as defined by me in the introduction to my synopsis of the Coleoptera of Kansas and New Mexico.‡

The preponderance of Tenebrionidæ, both in genera and species seen in the fauna of Upper California and Arizona has here been partially destroyed. The genera which survive are, however, such as are already known from the last mentioned region. None of those peculiar to maritime California have as yet occurred.

#### MEGASOMA Kirby.

*M. Thersites*, piceo-niger; ♂ sordide pubescens, capite cornu elongato apice bifurco, thorace dense punctulato, angulis anticis acutis divaricatis, cornu brevi apice emarginato, elytris punctulatis et obsolete punctatis; ♀ punctata, thorace glabro elytris parce pubescens, basi glabris. Long. 1·18—1·40.

Cape San Lucas. Very much smaller than the other species, of which it approaches most nearly to *M. Hector*, but the anterior angles of the thorax are divergent.

#### EURYOMIA Burm. (emend. Lac.)

*Eu. fascifera*, nigra, clypeo apice truncato et late reflexo, thorace latitudine haud brevior, lateribus obliquis parum rotundatis, nigro nitido, parce punctato, margine basali lateribusque flavis, his puncto nigro ante medium notatis, elytris opacis, a humeris paulo angustatis, margine humerali fasciis duabus latis apiceque flavis, pectore abdominisque lateribus pallide pilosis. Long. ·66.

Cape San Lucas.

#### CHALCOLEPIDIUS Esch.

*C. rubripennis*, niger, squamulis minutis aureo-smaragdinis dense tectus, thorace latitudine fere sesqui longiore, lateribus rotundatis, angulis posticis brevibus divergentibus, elytris rubris, striis nigris punctatis, interstitiis paulo convexis. Long. 1·11—1·75.

Cape San Lucas. A specimen also sent as found at Cajon Pass, California. Belongs to the group of the genus, having the scutellum triangular, slightly emarginate in front, and the third joint of the antennæ equal to the fourth. The antennæ are serrate in both sides.

#### LYCUS Fabr.

*L. cruentus*, læte coccineus, thorace latitudine brevior, apice carinato, deinde rhomboideæ impresso, elytris postice sensim dilatatis thorace duplo latioribus, margine costisque quatuor parum elevatis, interstitiis rugose punctatis, a dodrante ad apicem nigris, tibiis tarsis antennis capiteque nigris, hoc angusto thorace haud brevior. Long. ·37—·53.

Cape San Lucas. The elytra of the females are less dilated behind so as to be only one half wider than the thorax.

\* Proceedings Acad. Nat. Sci. 1859, 299.

† Ibid, 1861, 305.

‡ Smithsonian Contributions, vol. xi. p. iv. (These results are also alluded to on page 49 of these Proceedings for 1860.)

## PELECYPHORUS Sol.

*P. ægrotus*, ater opacus, thorace latitudine haud brevior, lateribus late rotundatis serratis, postice subangustato, et lateribus sinuato, angulis posticis acutis, basi late emarginato, lateribus et plaga dorsali postica transversim rugose punctatis; elytris thorace duplo latioribus, ovalibus postice valde declivibus et prolongatis, humeris rotundatis, margine costaque discoidali postice magis elevata et abbreviata rugis transversis undulatis elevatis connexis, epipleuris sublævibus. Long. .90.

One specimen. Cape San Lucas. In general appearance resembles in an extraordinary manner *P. morbillus* Lec. (Pr. Ac. 1858, 74), but, besides minor differences, the humeri are not toothed but rounded.

*P. bifurcus*, ater, subnitidus, thorace punctato valde convexo, lateribus rotundatis, basi sinuato, angulis omnibus acutis, margine anguste reflexo, dorso profunde canaliculato; elytris postice sensim latioribus, basi subemarginatis, angulo humerali distincto obtuse, parce punctatis, margine elevato pone trientem duplici. Long. .73.

One specimen. Cape San Lucas. The elevated lateral margin of the elytra bifurcates at the anterior third, the portions then diverge, neither reaching the tip; the inner is a little more elevated, but also a little shorter than the outer portion.

*P. sexcostatus*, sordide niger, parce pubescens, thorace latitudine paulo brevior planiusculo, lateribus late rotundatis anguste reflexis, angulis acutis, haud dense punctato; elytris elongato-ovalibus, parce punctatis, margine laterali serrulato costisque dorsalibus duabus, (interna integra, altera utrinque abbreviata) acute elevatis. Long. .50.

One specimen. Cape San Lucas. In form somewhat resembles *P. parallelus* Lec., but the sides of the thorax and elytra are more rounded.

## CENTRIOPTERA Mann.

*C. spiculifera*, nigra, subnitida, thorace latitudine brevior, postice angustato lateribus valde rotundatis, postice breviter paulo sinuatis, angulis posticis rectis; elytris elongato-ovalibus, thorace parum latioribus, seriatim punctatis, interstitiis internis planis parce uniseriatim punctatis, ad apicem et externis tuberculis valde acutis ornatis, femoribus posticis intus tuberculis exasperatis. Long. 1.08.

Larger and stouter than *C. muricata* Lec., with the tubercles more acute and more elevated, so as to become towards the apex actual short spines; the sides of the thorax are also not strongly punctured.

## CRYPTOGLOSSA Sol.

*C. seriata*, nigra subnitida, thorace latitudine brevior, parum convexo, postice modice angustato, lateribus rotundatis postice subsinuatis, angulis posticis rectis, elytris subovatis, postice subacutis, seriatim punctatis, interstitiis parce uniseriatim punctatis, externis postice tuberculis parum elevatis exasperatis. Long. .75—86.

Cape San Lucas. Has very much the form of Centrioptera, but the hind thighs are not at all serrate.

## CERENOPUS Lec.

*C. cribratus*, niger, subnitidus, thorace ovato, convexo, latitudine longiore, basi late subemarginato, elytris seriatim cribratis, ad apicem utrinque tuberculo magno obtuso, alteroque parvo suturali armatis. Long. .55—71.

Mas tibiis anticis introrsum sinuatis, et serratis, femoribus posticis dente magno acuto armatis.

Femina tibiis anticis crassioribus haud serratis femoribus posticis simplicibus.

Cape San Lucas. Of the same general form as *C. concolor* Lec.

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## DIABROTICA (Chevr.) Er.

D.? *insolita*, supra sordide flava, thorace latitudine duplo brevior, apice subsinuato angulis anticis prominulis, basi emarginato angulis obtusis subrotundatis, lateribus anguste marginatis, elytris thorace latoribus oblongis, confertim punctatis, gutta posthumerali, alteraque discoidali pone medium, nigris ornatis, scutello nigro; subtus niger, abdominis segmentis flavo-piceo marginatis, femoribus flavis palpis antennisque nigris, his thorace elytrisque haud brevicribus.

Mas alatus abdomine elytris haud longiore. Long. ·23.

Femina aptera, abdomine inflato, elytris plus duplo longiore. Long. ·46.

Cape San Lucas. The difference in size between the sexes is produced entirely by the abdomen of the female being immensely distended. The first joint of the antennæ is sometimes piceous, and the head has sometimes a short black occipital line. The thorax is moderately convex, with a slight impression at the middle, and another at the base; there is also a faint transverse impression before the middle. The second and third joints of the antennæ are together equal to the fourth.

It is extraordinary to find the genera of the Pacific coast of most diverse families in which the abdomen of one or both sexes is imperfectly covered by the elytra, and the wings wanting, thus unexpectedly increased by a Chysomelide. There does not appear to me any sufficient reason for separating the present species from *Diabrotica*, though I have not as yet studied the group to which it belongs sufficiently to entitle my opinion to much weight.

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New species of COLEOPTERA inhabiting the Pacific district of the United States.

BY JOHN L. LE CONTE, M. D.

The species described in the present paper have been derived partly from contributions of friends, partly from Government expeditions. Those from the Northwestern Boundary Commission were made by Mr. George Gibbs, and the late Dr. Kennerley; those from Lieut. Mullan's Wagon Road Expedition were collected by Mr. John Pearsall, and have been submitted to me by the Smithsonian Institution. It is much to be regretted that the most valuable portion of the last mentioned collection, procured within the mountainous region at the head of the Missouri river, has in great part been rendered by the collector unavailable for scientific research; the restrictions placed upon investigations by the Entomological Society of Philadelphia, now in possession of the larger part of the collection, being such as to render any satisfactory comparisons extremely difficult.

I must return my cordial acknowledgements to Mr. Andrew Murray, now of London, for the liberality with which he has given specimens, many indeed unique, in aid of my investigations; and also to Mr. Alex. Agassiz, for excellent collections made at San Mateo, Mendocino City, and on the Gulf of Georgia; and to Mr. C. M. Bache, U. S. Coast Survey, for a good series of species from the islands of Santa Barbara and Santa Cruz; and likewise to Mr. G. Davidson, U. S. Coast Survey, for his continued efforts in supplying specimens from California.

1. *Cicindela longilabris* Say. A beautiful green variety of this species was found at Kootenay Camp; a similar variety has been found in Newfoundland.

2. *Cicindela montana*, atra, labro magno, antice obtuse dentato, lateribus sinuato, thorace transverso, trapezoideo, modice convexo, confertim rugoso, impressionibus profundis, elytris nitidis, confertim punctatis, fascia trans-

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versa media sinuata, obtuse deflexa, sæpe deficiente alba; subtus nigra parce albo-pilosa. Long. .6.

Mas labro mandibularumque basi albis; femina labro mandibulisque nigris.

Valleys of the Rocky Mountains. Belongs to the same group (III. of my Monograph, Trans. Am. Phil. Soc. xi. 33) as *C. longilabris*, from which it differs at first sight by the shining and more deeply punctured elytra, as well as by the black labrum of the female.

3. *Trachypachys Gibbsii*, ovalis, nigro-æneus, nitidus, thorace latitudine fere duplo brevior, antrosum sensim angustato, lateribus rotundatis, postice profunde transversim impresso, utrinque subbifoveato, et parce punctato, elytris versus suturam seriatim punctatis. Long. .25.

East of Fort Colville. Larger and broader than *T. inermis Motsch.*, and very different by the form of the thorax and its posterior impression. The thorax is not at all narrowed behind, but gradually narrowed almost from the base to the apex; the impression is somewhat punctured, with two moderately distinct foveæ each side.

4. *Pterostichus oregonus*, longiusculus, niger, nitidus, (elytris femine opaciusculis) thorace latitudine haud brevior, postice angustato, lateribus late rotundatis postice subsinuatis, tenuiter marginatis, angulis posticis subrectis, basi utrinque parce punctato, et stria basali longiuscula impresso, linea dorsali profunda, elytris striis tenuibus haud punctatis, interstitiis planis, 3io foveis 5 impresso. Long. .55—58.

East of Fort Colville. This species belongs to the same division as *P. ornatum*, *adstrictus*, &c., (*Bothriopterus* Chaudoir), but differs much in shape from those species, resembling, in fact, very closely in outline our common *P. adoxus*, and having the margin of the thorax not wider than in that species.

5. *Anisodactylus viridescens*, elongato-oblongus, æneo-viridis, nitidus, capite utrinque fortius haud dense punctato, thorace latitudine paulo brevior, postice parum angustato, lateribus late rotundatis postice subobliquis haud sinuatis anguste marginatis, angulis posticis obtusis subrotundatis, basi utrinque impresso, apice basi lateribusque punctato, elytris striatis subpubescentibus, interstitiis alternis punctatis alternis, sublævibus, 3io postice 1-punctato; subtus niger. Long. .34—38.

California; Mr. A. Murray. Cape Mendocino; Mr. A. Agassiz. This species is related to *A. alternans Lec.*, but the sides of the thorax are not sinuate, and the hind angles are not prominent. The 3d and 5th intervals are smooth, but in most specimens, on close inspection, a series of small points is visible at their inner margin. The first and seventh intervals are free from punctures; the others are distinctly, but not densely punctured. The punctures emit very short pale hairs.

6. *Anisodactylus ptychrous*, elongato-oblongus, nigro-piceus, nitidus, thorace latitudine vix brevior, postice paulo angustato, lateribus tenuiter marginatis antice rotundatis, postice obliquis, angulis posticis subrectis, basi utrinque anguste impressa et punctulata, elytris striatis, interstitiis subplanis. Long. .40.

One male; California; Mr. A. Murray. This species has the form of *A. baltimorensis*, but the basal impressions of the thorax, instead of being large rounded foveæ, are narrow, and the punctures are confined to the depth of the impressions. The color of the head and thorax is almost black; the rest of the body has a decided piceous tinge.

7. *Harpalus fraternus Lec.* This species has an extensive range, being found in Oregon, Kansas, Nebraska and New Mexico; a somewhat immature specimen from the last named locality was described by me as *H. oblitus*.

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8. *Bembidium paludosum*. A specimen from Oregon, given me by Mr. Ulke, only differs from those found at Lake Superior, by the thorax being a little less transverse, and a little more narrowed in front. In a European specimen before me, the thorax is slightly and equally narrowed before and behind, and is but little broader than its length; the single specimen from Lake Superior, described by me as *B. lacustre*, exactly agrees with it in these respects. It is impossible to say with the limited series of specimens before me whether these three forms should be considered as races or species.

9. *Bembidium quadrulum*, æneo-nigrum, nitidum, thorace minus convexo latitudine brevior, subquadrato, postice vix angustato, lateribus lateribus rotundatis, angulis posticis subrectis, basi utrinque biimpresso, carinulae ad angulum munito; elytris thorace latioribus parum convexis, striis fortiter punctatis, ad apicem oblitteratis, 3ia bipunctata, 7ma ad apicem exarata. Long. .20.

East of Fort Colville; Mr. Gibbs. This species has the same size, shape, color and sculpture as *B. salbratus Lec.*, except that the striae of the elytra are obliterated at the tip, and the thorax is less rounded on the sides, scarcely perceptibly narrowed behind, with the hind angles more nearly rectangular. The inner basal impression is deep, and the outer one small; the posterior transverse impression and the dorsal line are deeply impressed. The eighth and ninth striae of the elytra are approximate, but do not unite until very near the shoulder.

10. *B. dyschirinum*, elongatum, convexum, nigro-æneum, pernitidum, thorace transverso cordato, postice angustato, lateribus rotundatis ad angulos posticos rectos breviter sinuatis, basi utrinque profunde foveato, et carinula externa munito, elytris ovalibus, thorace paulo latioribus seriatim punctatis, postice levibus, interstitio 3io bipunctato, tibiis tarsisque nigro-testaceis. Long. .19.

East of Fort Colville; one specimen. Allied to *B. nitens Lec.* (*Peryphus picipes* †Manu.), but is smaller and more convex, with the sides of the thorax less sinuate towards the hind angles, and the base free from punctures.

11. *Agabus morulus*, latusculus, subovatus, niger, nitidus, haud reticulatus, dense subtiliter punctulatus, antennis palpis tarsisque piceo-rufis, elytrorum seriebus punctorum fere obsoletis. Long. .22.

California; Mr. Murray; one specimen. Resembles in form *A. obtusatus*, but is less obtuse anteriorly, and not at all reticulated; the anterior tarsi of the male are but very slightly dilated, and the claws are not deformed. There is no appearance of elytral spots. The body is equally attenuated before and behind.

12. *Agabus lineellus*, regulariter ovalis, piceo-ferrugineus nitidus, subtilissime, reticulatus, elytris testaceis, sutura et vittis utrinque 4 angustis nigris antice abbreviatis, nebulisque externis piceis ornatis, seriebus punctorum solitis distinctis, sternis piceis. Long. .30.

California; Mr. Murray; one male. The only other vittate species found in the United States is *A. tæniolatus Harris*, from which this is abundantly distinct by the narrower vittae occupying only the inner two-thirds of elytra; the meshes of the reticulation are not so small; the head and thorax is clouded with darker color as in that species.

13. *Agabus confertus*, ovalis, modice convexus, æneo-niger nitidus, dense punctulatus, haud reticulatus, thorace minus fortiter marginato, latitudine fere triplo brevior, elytris lineola laterali guttaque postica pallidis ornatis, seriebus punctorum solitis distinctis, antennis ore pedibusque anticis piceo-rufis. Long. .32.

Cabo de los Reyes; Mr. G. Davidson; one male. Of the same form and size as *A. semivittatus Lec.*, but with the thorax shorter, more strongly nar-

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rowed in front, and less strongly margined at the sides, and the upper surface of the body much more strongly punctulate; the sides of the thorax also form a very obtuse angle with the sides of the elytra. The sexual characters are also different; in the present, the claws of the anterior tarsi of the male are long and slightly deformed; in *A. semivittatus* they are not elongated, but the inner one is toothed at the base. The trochanters and thighs of the middle and hind legs are tinged with reddish brown.

14. *Agabus discors*, elongato-ovalis, minus convexus, æneo-niger, dense minus subtiliter reticulatus, thorace lateribus modice rotundatis margine crassiore rufescente, ad basin elytris vix conspicue angustiore, his longitudinally reticulato-strigosis, ore maculis que solitis verticalibus piceo-rufis, pedibus rufo-tinctis. Long. .40.

Mas nitidus, elytris thoracisque lateribus profundius strigosis, tarsis anterioribus modice dilatatis, unguiculis anticis valde elongatis subsinuatis.

Femina opaca quasi velutina, elytris minus profunde strigosis.

Washington Territory; Mr. Gibbs. A very distinct species.

15. *Helophorus alternatus*, elongatus, capite rugoso, viridi-æneo, cupreo variegato, thorace latitudine fere sesqui brevior, postice subangustato, lateribus late rotundatis margine depresso latiusculo testaceo, angulis posticis subobtusis, præcipue versus latera granulato viridi-æneo, lineis 5 solitis latis profundis aureis, intermediis sinuatis, elytris elongato-ovalibus thorace parum latoribus, testaceis, fusco-nebulosis, vel piceis testaceo-maculatis, striis profunde crenatis, interstitiis seriatim punctulatis, 2do et 4to latoribus et minus convexis subtus niger, antennis palpis pedibusque pallidis. Long. .14—.15.

California; Mr. Murray. This species is more elongated than *H. lineatus*, and is readily known by the elytra being somewhat wider than the thorax, more regularly oval than usual, with 2d and 4th intervals wider and less convex than the others.

16. *Hydrocharis glaucus*, ovalis, convexus, supra nitore argenteo-cæruleo glaucus, thorace lateribus magis rotundatis, basi recta angulis posticis obtusis et rotundatis, punctis paucis versus latera notato, elytris striis e punctis parvis compositis, interstitiis alternis irregulariter grosse punctatis, alternis punctis paucis minutis impressis; subtus niger, pedibus cæruleo-glaucis. Long. .60.

California; Mr. A. Murray. A very beautiful species with the sides of the thorax more rounded than in *C. substriatus Lec.*, which it resembles somewhat in the sculpture of the elytra, though the striæ of punctures are more distinct, and the punctures of the intervals much larger.

17. *Philhydrus imbellis*, ellipticus, convexus, nitidus, dense punctulatus, capite nigro-piceo, thorace piceo, lateribus pallidis, elytris piceo-ochraceis vix conspicue striatim punctatis, stria suturali antice oblitterata, subtus niger, tibiis tarsisque testaceis. Long. .24.

One specimen; California; Mr. Murray. This species belongs to the group (a, *Lec. Proc. Acad. Nat. Sc. Phil.* 7, 369,) having the mesosternum and prosternum not carinated. It differs from the other species known to me by the faint traces of striæ upon the elytra; the three confused rows of punctures seen in the others are here scarcely observed as separate from the rows of punctures constituting the striæ.

18. *Philhydrus normatus*, ovalis, modice convexus, nigro-piceus, nitidus, vix punctulatus, elytris striis integris 10, scutellarique e punctis digestis compositis, antennarum basi palpisque testaceis. Long. .22.

One specimen; Bodega; Mr. Davidson. The prosternum is not carinated, the mesosternum has a small protuberance near its hind margin. The outer  
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striae of the elytra are deeper than the inner ones, and the intervals in some places are marked with faint traces of obsolete intermediate striae.

19. *Cyllidium nigrillum*, hemisphaericum, nigrum nitidum, elytris parce subtilissime punctulatis, stria suturali profunda antice obliterata, pedibus piceis. Long. .06.

San Diego, California. The sides of the thorax and elytra are diaphanous, and therefore appear brown by transmitted light.

20. *Cyllidium pallidum*, hemisphaericum, nitidum, capite thoraceque piceis, hoc limbo omni pallido, elytris pallidis, parce subtilissime punctulatis, stria suturali profunda antice obliterata; subtus piceum, antennis palpis pedibusque pallidis. .05.

At the junction of the Colorado and Gila rivers, California, under stones and pieces of wood, in wet places.\*

21. *Thinopinus variegatus*; *Trichocanthus variegatus* Motsch. A specimen found by Mr. Davidson at Bodega differs in many respects from those of *T. pictus Lec.*, found by me at San Diego. The head is destitute of the Y-shaped frontal spot, which in *T. pictus* is connected with the occipital transverse spot; the latter is much more defined, and different in shape. The two ring-shaped black spots of the thorax are interrupted opposite the hind angles of the thorax, but the basal portion is complete; in *T. pictus* it is the latter that is absent. The elytra are sparsely but strongly punctured, the lateral margin and a semiannular spot extending from the base to the external hind angle is black; in *T. pictus* the elytra are very feebly punctured, and the elytral spot is annular, interrupted towards the humerus. The spots of the dorsal surface of the abdomen are much larger, than in *T. pictus*.

22. *Hadrotus extensus*. Several specimens found by Mr. Gibbs in Washington Territory differ from the Russian American *H. crassus*, by the body being much more slender, and the thorax comparatively longer. In sculpture I find no difference, but the form of the thorax and body requires them to be regarded as indicating a separate species, to which the present name is applicable.

23. *Staphylinus submetallicus*, æneo-niger, pubescens, capite thoraceque nigro-æneis, confertissime punctatis, illo linea tenui lævi antice obliterata, hoc latitudine longiore, lateribus parallelis, vitta dorsali nitida lævi; scutello atro-tomentoso, elytris nigro-æneis, densissime subtilius punctatis; abdomine dorso pube subtili aureo-variegato bifariam nigro-maculato. Long. .62.

Tejon; Mr. Xantus, one specimen; another one from Mr. Murray. The outer joints of the antennæ are somewhat transverse.

24. *Staphylinus saphyrinus*, niger pubescens, capite thoraceque læte cyaneis, dense punctatis, illo linea tenui lævi antice obliterata, hoc latitudine longiore, postice paulo angustato, vitta dorsali nitida lævi, elytris cyaneis densissime subtilius punctatis, abdominis segmentis duobus ultimis, palpis, coxis pedibusque læte rufo-testaceis, antennis piceis basi rufescentibus. Long. .40—52.

San Jose and Fort Tejon, California. The outer joints of the antennæ are slightly transverse.

25. *Staphylinus luteipes*, niger, pubescens, capite thoraceque olivaceo-

\* I add the description of a third species from the Atlantic district.

*C. nigriceps*, hemisphaericum, supra pallide testaceum nitidum, capite nigro, thoracis disco obscuriore, elytris parce subtiliter punctulatis, stria suturali antice obliterata; subtus nigro-piceum, antennis palpis pedibusque pallidis. Long. .06.

Lake Superior, one specimen.

aneis, dense fortiter punctatis, illo linea tenui lævi antice oblitterata, hoc latitudine longiore postice paulo angustato, vitta dorsali nitida lævi, elytris confertissime subtiliter punctatis, olivaceo-aneis, abdomine vix maculato, pedibus rufis vel rufo-piceis. Long. .56.

San Jose, California, under bark of oak trees. The ventral segments are sometimes annulate with dark red. The outer joints of the antennæ are slightly transverse. These three species and the next belong to Erichson's 8th family.

26. *Staphylinus pleuralis*, piceo-niger, fusco-pubescent, capite thoraceque dense sat fortiter punctatis, illo linea tenui lævi antice oblitterata, hoc latitudine longiore, postice paulo angustato, vitta angusta dorsali lævi nitida, scutello atro-tomentoso, elytris confertissime subtiliter punctatis, piceis, lateribus late obscure rufis, abdomine supra tomento aureo irrorato, pedibus rufis, coxis piceis. Long. .56—'63.

Oregon. The punctures of the head and thorax are finer than in *S. luteipes*. The golden pubescence of the dorsal segments seems to be generally diffused, so far as I can judge by the specimens before me, and there are faint indications of two rows of velvety black spots.

27. *Liparocephalus brevipennis* *Maklin*, Bull. Mosc., 1853, 191.

A specimen collected by Mr. A. Agassiz at Cape Mendocino agrees with the description of this species, except that the color is dark brown, and the antennæ are not obviously shorter than the head and thorax. A comparison with a specimen from Russian America will be necessary before it will be proper to express an opinion regarding the specific nature of these differences.

28. *Hister (Platysoma) punctiger*, elongatus, parallelus, parum convexus, niger nitidus, capite parce punctulato fronte vix concava, striola integra, thorace disco punctulato, lateribus parce punctatis, stria marginali ad apicem ambiente, elytris obsolete parce punctulatis, apice punctis paucis, notatis, 6-striatis striis internis duabus ante medium antice abbreviatis (interno longiore) punctoque basali notatis; mesosterni stria marginali integra; pedibus piceo-rufis, tibiis anticis 4-, intermediis 3-, posticis 2-dentatis. Long. .16.

California. Mr. A. Murray. Larger and wider than *H. parallelus*, and much less convex, resembling in form *H. æquus* *Lea.*, but much larger and a little more convex.\*

AMARTUS. (n. g. Nitidulidæ, trib. Brachypterini.)

Palpi labiales articulo ultimo elongato, ovali; unguiculi simplices, pygidium ♂ segmentulo anali auctum.

The external appearance of the species of this genus described below is that of *Carpophilus*, and very nearly that of *C. niger*, but the absence of antennal grooves will at once distinguish it. The outer lobe of the maxillæ is long and slender, not hooked at the extremity, with a large terminal vesicle. The labial palpi have the first joint short, the second one half shorter than the

\*Resembling in appearance this species, but still larger and more convex, with the striæ of the elytra more distinctly punctured, and the sutural striæ shorter than the inner dorsal one is a species from Ohio given me by Mr. Ulke, which I would name

*Hister (Platysoma) basalis*, elongatus, cylindricus, niger nitidus, capite parce punctato, fronte concava, striola integra, thorace disco parce punctulato, versus apicem et lateribus paulo fortius, stria marginali ad apicem ambiente, elytris ad basim profunde transversim impressis, fere marginatis, 6-striatis, striis punctatis, duabus internis antice abbreviatis (interno brevioribus); mesosterni stria marginali apice deficiente, pedibus, nigris tibiis anticis 4-, intermediis posticisque 3-dentatis. Long. .20.

1861.]

third, which is elongate oval; the maxillary palpi have the last joint conical, a little longer than the preceding. The mentum is broad, emarginate in front. The labrum is emarginate, the mandibles flat, not toothed. The club of the antennæ is 3-jointed and elongate, the joints but slightly transverse. The second and third ventral segments are shorter than the first and fourth; the fifth is the longest; in the males a small but distinct dorsal segment is added. The tibiæ are broad and pubescent, with small terminal spurs; the tarsi are dilated, the claws slender, a little broader at the base, but not toothed.

29. *A. rufipes*, ovalis parum convexus nigro-piceus, helvo-pubescent, coniform punctatus, thorace latitudine fere duplo brevior, antice truncato, lateribus et basi rotundato, elytris thorace sesqui longioribus, lateribus et apice late indeterminate rufo-testaceis, antennis pedibusque rufo-testaceis. Long. .20.

Mendocino, California. A. Agassiz. The surface is equally punctured both above and beneath. The antennæ are as long as the head and thorax united.

30. *Trogosita sinuata*, nigro-picea nitida, depressa, capite thoraceque sat parce punctatis, hoc latitudine paulo brevior, postice parum angustato, lateribus late rotundatis, postice sinuatis, margine fortius reflexo, angulis posticis rectis, basi sinuatim truncata, elytris oblongis, basi late emarginatis, humeris rectis, striis punctatis haud impressis, interstitiis planis, parce rugulosis, biserialiter subtiliter punctulatis, antennis pedibusque piceo-rufis, illis clava triarticulata. Long. .28.

East of Fort Colville, one specimen; Mr. Gibbs. This species resembles in appearance *T. corticalis* Mels., and several others from the Atlantic States, but is easily known by the thorax being less transverse and less narrowed behind, with the hind angles more prominent, and the base not rounded, but nearly truncate and sinuate, and slightly emarginate at the middle.

31. *Trogoderma ornatum* Lec. Proc. Acad. Nat. Sc. Phil. 7, 110.

A specimen of this species from California, differing from those found in New York, by the spots of white hair being larger, was sent me by Mr. A. Murray.

32. *Cryptorhopalum nigricorne*, ovale convexus, nigrum pubescens, subtiliter dense punctatum, thorace lateribus oblique late rotundatis, tarsis piceis, antennis nigris basi piceis. Long. .09.

California, one specimen; Mr. Murray. Differs from *C. triste* and *piceorne* Lec. (Proc. Acad. 7, 111), by the surface being more finely punctured both above and beneath, by the sides of the thorax being less rounded, and by the club of the antennæ being black.

33. *Orphilus subnitidus*, ovalis convexus, antice obtuse attenuatus, niger subnitidus, thorace punctulato, ad basin vage arcuatim impresso, angulis posticis paulo prolongatis, lateribus subexplanatis, valde declivibus, elytris sat subtiliter punctatis, dorso ante medium vage impressis. Long. .13—16.

*Le Conte*, Classification of Coleoptera of North America, 109.

California and Oregon. Broader, larger and more finely punctured than *O. ater* Er.

34. *Syncalypta albopunctata*, ovalis, utrinque attenuata, convexa, nigra, fusco-squamulosa, setis clavatis longiusculis nigro-piceis hispida, elytris guttis pluribus parvis argenteo-squamosis ornatis, capite thorace que dense punctatis, elytris striis tenuibus, suturali postice externisque profundis. Long. .11.

Washington Territory, one specimen; Mr. Ulke. Larger than *S. echinata* Lec., with the thorax more coarsely and densely punctured; easily known by the silvery white spots of the elytra.

35. *Dorcus mazama* (♂) nigro-piceus, capite punctato, thorace vix angustiore, mandibulis apice acutis, dente parvo medio armatis, thorace latitudine plus duplo brevior, postice angustiore, lateribus medio obtuse angulatis, angulis posticis rectis, disco modice, versus latera sat dense punctato, elytris modice punctatis subtiliter rugosis, tibiis anticis 4-dentatis, et dente superiore obsolete munitis, tibiis posterioribus dentibus 3 lateralibus apicalique acutis armatis. Long. (mand. excl.) 1.20

New Mexico, Mr. Ulke, one male. This species is alluded to by me on page 120 of my Classification of the Coleoptera of North America, as belonging to *Lucanus*, but the form of the labrum, which is rectangular and about four times as broad as its length, requires it to be placed in *Dorcus*. The outline of the thorax differs very greatly from that of our other species, in which the sides are simply and broadly rounded: in the present species the form is as in *Lucanus mazama*, but a little more dilated on the sides. The third tooth of the middle and hind tibiæ is double, that is, there are two sharp teeth placed transversely, so as to present the appearance of a single tooth.

36. *Platycerus coerulescens* (♂), niger, capite thoraceque parce grosse punctatis, hoc transverso, lateribus antice rectis paulo convergentibus, pone medium inflexis, angulis posticis obtusis haud rotundatis, elytris nigro-cyaneis, punctis striatim digestis, interstitiis irregulariter subseriatim punctatis; mandibulis sursum incurvis, dente infero pone apicem, alteroque superno armatis. Long. (mand. inclus.) .48.

Tejon and Vallecitas, California. Closely related to *P. quercus*, but the punctures of the head and thorax are much more distant, the lateral margin of the thorax is narrower, the elytra are not at all rugous, and there are no denticles between the apex of the mandibles and the tooth on the inferior margin: the 6th joint of the antennæ is transverse as in *P. quercus*, and the club consists of four joints.

37. *Platycerus Agassii*, (♀) elongato-ovalis, supra obscure æneus, capite thoraceque sat dense punctatis, hoc linea dorsali lævi, latitudine duplo brevior, lateribus fortiter marginatis valde rotundatis, angulis posticis rectis prominulis, elytris obsolete striatis, striis punctatis, interstitiis rugosis confuse punctatis; tibiis posticis denticulo externo ad medium armatis. Long. .38.

One specimen, San Mateo, California, Mr. A. Agassiz. Closely related to *P. depressus Lec.* (with which *P. oregonensis Westwood* is probably identical), but differs by the thorax being wider, with a distinct dorsal smooth line, by the interstitial punctures of the elytra being smaller, but especially by the hind tibiæ having a small sharp tooth about the middle on the outer edge. The seventh joint of the antennæ is not transverse, and the mandibles are small and acute, without teeth.

#### DASYDERA Lec.\* (n. g. Scarabæidæ Glaphyrini.)

Antennæ 10-articulatæ, clava maris scapo haud brevior triarticulata, articulis haud approximatis; palpi maxillares articulo ultimo ovali, majusculo, extus profunde excavato; mandibulæ parvæ obtusæ; labrum late emarginatum. Unguiculi basi latiores, haud dente armati.

The species of this genus resembles precisely in form *Lichnanthe vulpina*, but is still more hairy: the characters are entirely as in *Lichnanthe*, except that the club of the antennæ is larger, the labrum is less deeply emarginate, the maxillary palpi are thicker, and the last joint is oval instead of elongate, and the claws are not toothed at the base.

38. *D. ursina*, nigra, pilis longissimis pallidis sericeis dense tecta, capite thoraceque confertissime subtilius punctatis, elytris pallide testaceis, subgla-

\* Class. Col. N. America, p. 133.

bris, sat parce punctatis, abdomine brevioribus, apice dehiscentibus obtuse rotundatis, tibiis tarsisque antennisque rufo-testaceis, his basi nigris. Long. .52.

California, one male, Mr. A. Murray. The abundance of hair conceals the form of the thorax, which appears to be more gradually narrowed in front than in *Lichnanthe vulpina*.

39. *Diplotaxis insignis*, oblongo-ovata, convexa, rufo-ferruginea, nitida, capite confertim fere grosse punctato, clypeo marginato, antice subtruncato, sutura frontali profunda, fronte transversim vix elevata; thorace fortiter punctato, brevi, ante medium valde angustato, lateribus obliquis ad medium obtuse angulatis, angulis posticis obtusis, anticis acutis, ad apicem marginato, elytris fortiter parcius punctatis, vix tricostatis, tibiis anticis tridentatis dente ultimo oblique truncato, unguiculis medio breviter dentatis. Long. .52.

Salt Lake Desert. Resembles at first sight an immature specimen of *D. brevicollis Lec.*, but belongs to a very different group of species, being related to *D. Haydenii Lec.*, (*Journ. Acad.* 2d ser. 3, 272). It differs from the last named by the larger size, by the head and thorax being much more thickly and coarsely punctured, and by the elytra being more sparsely punctured; the usual smooth lines of the latter are scarcely elevated, and are marked with a row of small punctures.

40. *Phobetus testaceus*, longius ovatus, convexus, flavo-testaceus nitidus, capite sat dense punctato, clypeo rotundato fortiter marginato, thorace parce subtiliter punctato, apice valde marginato, lateribus pilis longis fimbriato, elytris parce haud profunde punctatis, lineis solitis lævibus, margine laterali et basali longe flavo-pilosis, stria suturali profunda; pygidio parce subtiliter punctulato, et piloso; pectore pedibusque longissime pilosis, antennis 10-articulatis. Long. .58.

One male, Santa Cruz Island, California; Mr. C. M. Bache. Differs from *P. comatus Lec.* by the 10-jointed antennæ, by the thorax being pilose only along the side margins, more finely punctured, without any large punctures at the anterior part, and by the pygidium being very finely, scarcely distinctly punctured.

A female with 9-jointed antennæ, from Oregon, differs from the type of *P. comatus* by the head being less coarsely and not confluentely punctured, and by the punctures and smooth ribs of the elytra being quite well marked. I am not willing, in the absence of other specimens, to consider it as a distinct species.

41. *Cyclocephala hirta*, oblongo-ovalis, testacea convexa nitida, pilis flavis parce vestita, clypeo confluentely punctato antrorsum sensim angustato, lateribus anguste, apice obtuso fortius marginato; thorace latitudine duplo brevior antice angustato, lateribus valde rotundatis, parce punctato, elytris punctatis, vittis solitis lævibus. Long. .50.

One male, California, Mr. A. Murray. A very distinct species. The club of the antennæ is as long as the inferior portion, and the last joint of the anterior tarsi is large and tumid, with unequal claws. The frontal suture is well marked; the clypeus is confluentely punctured; the head behind the suture is slightly convex, coarsely but not densely punctured.

42. *Chrysobothris vulcanica*, depressa subtus nigro-cuprea, supra æneo-nigra, fortiter punctata, thorace brevi cicatricoso vage 3-canaliculato, costis parcius punctatis, lateribus utrinque incurvis, elytris lineis solitis elevatis interruptis, nitidis punctis paucis notatis transversim connexis, spatiiis depressis sat dense punctatis, cinereo-tinctis, postice serrulatis, apice singulatum rotundatis. Long. .60—.63.

East of Fort Colville. Mr. Gibbs. Allied to *C. dentipes* and *californica*, with the elytra sculptured as in the latter, but with the elevated parts of the thorax rugous and punctured, though not so thickly as the depressed portions.

43. *Elater mœrens*, ater, parum nitidus, subtiliter cinereo-pubescent, thorace latitudine haud brevior, convexo, confertim fortiter punctato, postice vix canaliculato, elytris antice parallelis, profunde punctato-striatis, interstitiis convexiusculis rugose punctatis, antennis articulo 3io 2ndo sesqui longiore, tarsisque fuscis. Long. '46.

East of Fort Colville, and at Sinyak water depot. Mr. Gibbs. Precisely resembles *E. luctuosus* Lec., except that the pubescence is finer and cinereous, instead of brownish gray, and that the third joint of the antennæ is a little longer, and the thorax a little more rounded on the sides.

44. *Elater dimidiatus*, niger nitidus, pube brevi griseo-fulva haud dense vestitus, thorace latitudine vix brevior, lateribus magis rotundatis, fortiter haud dense punctato, postice canaliculato, elytris antice parallelis, profunde punctato-striatis, interstitiis paulo convexis, rugose punctatis; a basi usque ad medium rufo-testaceis, tarsis fuscis, antennis articulo 3io 2ndo sesqui longiore. Long. '36.

One specimen, Oregon. Related to *E. apicatus*, but the thorax is more rounded on the sides, and less closely punctured. The orange color of the elytra reaches only to the middle, and extends farther along the sides than the suture.

45. *Cardiophorus longior*, elongatus, niger nitidus, subtiliter cinereo-pubescent, thorace latitudine conspicue longiore, convexo, lateribus late rotundatis, antice posticeque æqualiter parum angustato, confertim subtiliter punctulato, elytris thorace vix latioribus fortiter punctato-striatis, interstitiis paulo convexis subtilissimè punctulatis, antennarum articulo 2ndo, genubus, tibiis apice tarsisque fusco-testaceis. Long. '31.

Bitter Root Valley, at the head of the Missouri. Mr. John Pearsall. The specimens furnished me, like all those collected by Mr. Pearsall, who was attached to Lieut. Mullan's expedition, which have passed through my hands, are in excessively bad condition, and I am therefore not able to fix the characters of this species with precision. It is related to *C. tennidicollis* and *gagates* Lec., but differs by the much longer thorax, which is equally narrowed before and behind. From the Californian *C. tenebrosus* Lec. it differs by the same character, as also by the color being pure black. The hind angles are but slightly prolonged, the basal lines are moderately long, and the thorax is channeled at the base.

As several specimens of other insects, in the collection of Mr. Pearsall, had lost their color from some material in which they were preserved, it is possible that the antennæ may be found to be entirely black in those which are well kept.

46. *Melanotus variolatus*, nigro-piceus, elongatus, griseo-pubescent, fronte subplana punctis grossis umbilicatis confertis impressa, thorace latitudine parum longiore, lateribus parallelis antice rotundatis, confertim grosse punctato, punctis umbilicatis, postice subcanaliculato, angulis posticis carinatis haud divergentibus, elytris fortiter punctato-substriatis, interstitiis parum convexis parce punctatis, pedibus rufis; antennarum articulo 3io 2ndo sesqui majore subtriangulari. Long. '45—'55.

San Pedro, California, Mr. C. M. Bache. Related to *M. oregonensis* and *longulus*, but differs from the first by its rufous feet, and more densely punctured thorax, and from both by the sides of the thorax being more rounded, with the hind angles not diverging.

The thorax of the female is broader, more convex and more rounded on the sides than that of the male.

47. *Pityobius Murrayi*, niger subnitidus, subtiliter vix conspicue pubescens, thorace fortiter punctato, latitudine longiore lateribus late rotundatis, angulis posticis productis divergentibus, carinatis, profunde canaliculato, 1861.]

medio valde excavato, et utrinque ante medium fovea magna impresso, elytris striis punctatis, interstitiis paulo convexis, dense rugose punctatis, antennis articulo 3io 2ndo duplo majore. Long. ♂.78, ♀ 1.42.

Mas antennarum articulis 4—11 ramo subbasali interno, duobusque externis, uno basali, altero pone medium ornatis.

Femina antennis serratis.

California. The male from Mr. Murray, the female from Mr. Rathvon.

48. *Limonius discoides* rufo-testaceus, opacus, pallide pubescens, capite fortiter punctato, occipite nigro, fronte plana antice recte truncata, thorace fortiter dense punctato, latitudine longiore antrorsum angustato, lateribus late rotundatis angulis posticis brevibus carinatis, convexo, macula ovali dorsali nigra, elytris striis punctatis, interstitiis haud convexis, profunde punctatis, antennis piceis, articulo 3io 2ndo plus sesqui longiore, postpectore piceo; prosterno suturis antice excavatis. Long. .40.

Rocky Mountains, at the head of Missouri River; for this beautiful species, I am indebted to Mr. H. Feldmann.

49. *Dolopius ferrugineipennis*, elongatus, niger, cinereo-pubescens, capite thoraceque dense punctatis, hoc latitudine longiore, a medio antrorsum angustato, lateribus late rotundatis, angulis posticis elongatis divergentibus fortiter carinatis, elytris rufo-testaceis, striis punctatis, interstitiis subconvexis dense punctatis, antennis (?) pedibusque flavo-testaceis. Long. .42.

Oregon. A specimen with only the basal joint of the antennæ remaining. Easily distinguished from our other species by the form of the thorax.

50. *Asaphes tumescens*, nigro-piceus, fusco-pubescens, capite thoraceque fortius sat dense punctatis, hoc (feminæ) convexo, latitudine paulo longiore postice canaliculato, lateribus rotundatis magis ad apicem, versus basim paulo angustato, angulis posticis acutis parallelis fortiter carinatis, elytris striis punctatis, interstitiis paulo convexis punctulatis, antennarum articulo 3io 2ndo duplo longiore et 4to paulo angustiore. Long. .49—53.

Santa Cruz Island, California. Mr. Bache. Closely allied to the dark varieties of *A. decoloratus*, but the head and thorax are much more strongly punctured. The second joint of the antennæ is shorter, being only half as long as the third, and the striæ of the elytra are more strongly punctured.

51. *Asaphes oregonus*, niger, pube longiore fulva suberecta vestitus, capite fortiter thorace sat dense subtilius punctato, hoc angulis posticis carinatis paulo divergentibus, elytris flavo-testaceis, striis subtilius punctatis, interstitiis planis rugosis et punctulatis; antennarum articulo 3io 2ndo sesqui longiore, pedibus fusco-piceis, tibiis partim, tarsisque fuscis. Long. .32—40.

Mas thorace latitudine longiore, antrorsum sensim angustato, lateribus late rotundatis.

Femina thorace latitudine fere brevior, convexiore apice magis angustato, lateribus magis rotundatis.

Oregon.

*Sericosomus flavipennis*. A specimen from Mr. Murray agrees with the description of *Dolerosomus flavipennis* *Motsch.* (Bull. Mosc. 1860,) except that the apical margin of the thorax is not testaceous. The color is variable in our common *S. silaceus*, so that I am not inclined to consider my specimen as a distinct species from that described by Mr. Motschulsky. It is closely allied to *S. silaceus*, but differs by the antennæ being nearly black, and by the thorax being less deeply punctured, with the hind angles less diverging, (but is perhaps merely a variety of *S. debilis* *Lec.*, Proc. Acad. Nat. Sc., 1859, 72;) the latter is of a pale testaceous color, with only the head obscure. These variations in color are all seen in *S. silaceus*.

52. *Corymbites colossus*, niger, capite thoraceque subnitidis, fortiter

[Nov.



punctatis, fronte late concava, thorace (♀) convexo vix obsolete canaliculato, latitudine haud brevior, apice angustiore, lateribus modice, magis ad apicem rotundatis, angulis posticis paulo divergentibus fortiter carinatis, linea lævi dorsali obsoleta postice notata, elytris fere opacis, dense punctatis et rugulosis, punctis vix majoribus striatim digestis, antennis thorace brevioribus, valde serratis, articulo 3io 2ndo sesqui longiore, haud dilatato. Long. 1·07.

California. Mr. S. S. Rathvon. The joints of the antennæ 4-10 are very strongly triangular, gradually smaller; the eleventh joint is also triangular, with the oblong appendage still more distinct than usual.

53. *Corymbites conjungens* Lec. A specimen of this species was sent by Mr. Murray, in which the entire prothorax is of a brownish red color. Were it not for the slightly pubescent surface, I should consider this species as *Dianctus diversicolor* Esch., a species which has not been identified in recent times, but which may be more nearly allied to *C. rotundicollis*.

54. *Corymbites anthrax*, elongatus, niger, nitidus, pube brevissima cinerea parce obsitus, capite fortiter dense punctato, fronte fere plana, thorace lateribus confluentibus medio parcius fortiter punctato, oblongo, latitudine vix sesqui longiore, lateribus subrectis, angulis posticis acutis divergentibus carinatis, elytris striis punctatis, interstitiis subplanis disperse punctatis, antennis modice serratis articulo 3io 4to paulo longiore. Long. ·75.

Bodega, California; one female. Mr. G. Davidson. Almost as slender in form as *C. pyrros*.

55. *Aplastus optatus*, fuscus, pube cinerea vestitus, thorace latitudine haud longiore, antrosum sensim angustato, lateribus rectis, angulis posticis elongatis carinatis valde divaricatis, punctato, canaliculato, elytris substriatis, interstitiis subplanis rugose punctatis. Long. ·52—·70.

Mas oculis prominulis valde convexis, antennis articulis 3-10 apice externo paulo productis.

Femina oculis minus convexis, antennis articulis triangularibus.

California, Mr. A. Murray. Bodega, Mr. Davidson. Differs from *A. speratus* Lec. (Proc. Acad. 1859, 73), by the less elongated thorax and more distinctly carinated posterior angles.

56. *Sandalus californicus*, niger parce pubescens, thorace latitudine summa duplo brevior, a basi antrosum fortiter angustato, lateribus rectis, subcanaliculato, apice et basi vage impresso, parce punctato, dense punctulato, elytris flavo-testaceis nitidis fortiter punctatis. Long. ·60.

California, Mr. Murray; one male. Resembles in sculpture the male of *S. niger*, but is more robust in form, the pubescence is much less dense, the thorax is very transverse, and the antennæ are black.

57. *Macropogon piceus*, nigro-piceus, nitidus, fusco-pubescens, capite fortiter punctato, thorace latitudine brevior, trapezoideo, antrosum angustato, basi bisinuato, lateribus rectis, angulis posticis acutis, sat dense punctato, foveis duabus posticis obliquis densius punctatis notata, elytris subtiliter striato-punctatis, interstitiis rugosis et punctulatis, antennis elongatis, articulis 2-4 conjunctis 5to longitudine æqualibus. Long. ·31.

East of Fort Colville, Mr. Gibbs. This genus was placed by Motschulsky (Bull. Mosc. 1860) among the Elateridæ; it in reality belongs to the Dasyclidæ, vide Classif. of Coleoptera of N. America, page 178.

58. *Calopteron megalopteron*, nigrum, thorace minuto carinato, lateribus flavis late reflexis, latitudine vix brevior, angulis posticis acutis valde divergentibus, elytris flavis corpore duplo longioribus, a basi sensim valde dilatatis, lateribus extrorsum concavis, apice valde rotundatis, reticulatis, costis solitis elevatis, fascia ad trientem anticam, trienteque postica cyaneo-1861.]

nigris, trochanteribus femorumque basi flavis. Long. (elytr. inclus.) ·47—·62; lat. elytr. max. ·36—·50.

Oregon. Differs from our other species by the much larger size of the elytra, which are so much dilated behind that their greatest width is but little less than their length, and the lateral outline is decidedly concave. The sides of the thorax before the angles are nearly parallel; the apex, as usual, is semi-circular.

59. *Podabrus torquatus*, niger (cinereo-pubesens?), nitidus, capite flavo, antice lævi pone antennis fortiter punctato, cervice nigro-piceo, thorace flavo latitudine plus sesqui brevior, lateribus rotundatis late reflexis, angulis anticis rotundatis, posticis dentiformibus prominulis, antice late transversim concavo et parce punctulato, basi marginato, pone medium linea dorsali profunda impresso, elytris subtilius rugose punctulatis, abdominis lateribus anoque pallidis, pedum antennarumque basi testacea; his articulo 3io 2ndo duplo longiore, at 4to brevior, palpis nigris basi flavis. Long. ·38.

Bitter Root Valley, Rocky Mountains. Lieut Mullan's Expedition; collected by Mr. Pearsall. The pubescence has been all removed. The claws are pale yellow, and cleft, with the under portion scarcely shorter than the upper.

60. *Podabrus mellifluus*, niger opacus cinereo-pubesens, capite ante antennis flavo, parce punctato, postice fortiter punctato, thorace latitudine duplo brevior, lateribus late rotundatis, angulis anticis rotundatis, posticis obtusis haud prominulis, confertim subtiliter punctato, lateribus late rufotestaceis; elytris dense subtiliter rugose-punctatis. Long. ·40.

California, Mr. Murray. Quite distinct by the above characters from any other species found within the United States. The third joint of the antennæ is longer than the second, but shorter than the fourth; the first three joints are testaceous beneath: the claws are cleft, the under part scarcely shorter than the upper.

61. *Podabrus scaber*, elongatus, niger opacus cinereo-pubesens, capite ante antennis, fere lævi utrinque testaceo, postice dense punctato, collo valde elongato, thorace latitudine haud brevior, lateribus postice rectis antice rotundatis, angulis posticis rectis vix prominulis, confertim punctato, antice transversim late concavo, postice linea dorsali impressa, lateribus late rufotestaceis, elytris dense granulato-rugosis. Long. ·42.

Oregon. The first joint of the antennæ is yellow beneath, the third joint is one-half longer than the second, and not shorter than the fourth; the claws are acutely toothed about the middle.

62. *Podabrus corneus*, valde elongatus, supra testaceus nitidus, capite antice lævi, postice piceo sat fortiter punctato, thorace latitudine haud brevior, lateribus late rotundato, angulis posticis acutis, vix punctulato, antice, ad latera, et disco late concavo, inde obtuse bicostato, elytris confertim rugose punctulatis; subtus niger, trochanteribus, femorum apice, tibiisque anticis testaceis; tarsis antennisque fuscis, his basi testaceis. Long. ·38.

California, Mr. S. S. Rathvon. Bears a striking resemblance in appearance to *Telephorus larvalis* Lec. The third joint of the antennæ is intermediate in size between the second and fourth: the claws are cleft, with the inferior portion but little shorter than the superior.

63. *Podabrus macer*, valde elongatus, niger opacus cinereo-pubesens, capite confertim punctulato, thorace latitudine longiore, lateribus fere rectis parallelis pallide testaceis, angulis anticis rotundatis, posticis obtusis, punctato, antice posticeque late transversim concavo, disco pone medium costis duabus magnis obtusis elevatis, elytris dense rugose punctulatis, antennarum articulo 3io 2ndo duplo longiore, at sequente paulo brevior. Long. ·31.

San Mateo, California, Mr. A. Agassiz. The antennæ are not much shorter

than the body, the legs are long, and the claws are furnished with a large square tooth at base, extending beyond their middle.

64. *Malthodes transversus*, nigro-piceus, cinereo-pubescentis, thorace flavo, latitudine fere duplo brevior, undique marginato, lateribus fuscis rectis parallelis, disco oblique bimpreso, elytris rugose punctatis, antennis pedibusque fuscis, illis articulo 1mo testaceo, sequentibus æqualibus. Long. .11. Santa Cruz Island, Mr. Bache.

65. *Thanasimus rubriventris*, niger, pubescens, capite thoraceque subtiliter punctatis, elytris dense punctulatis, striis externis ultra medium extensis, internis valde abbreviatis, sutura antice, fascia angulata antice alteraque latiore prope apicem dense cinereo-pubescentibus, abdomine sanguineo. Long. .30.

East of Fort Colville, Mr. Gibbs. Resembles in form and sculpture *C. nubilus Kling*, but differs by the legs being entirely black, and by the outer rows of punctures of the elytra being longer: the elytra are also more parallel and less convex.

66. *Thanasimus nigriventris*, niger, pubescens, capite thoraceque subtiliter punctatis, elytris punctulatis, striis omnino oblitteratis, sutura antice, fascia transversa ad quadrantem, altera angusta angulata ad medium, maculæ magna apicali dense cinereo-pubescentibus. Long. .27—.35.

East of Fort Colville, and in Bitter Root Valley. Of the same shape as the preceding, but differs by the body being entirely black. The usual rows of punctures on the elytra are completely wanting; about one-fourth from the base a broad band of cinereous pubescence extends from the suture nearly to the margin; the suture from the base to the band is also clothed with cinereous hair; behind this band, but about the middle, instead of before the middle, as in the other species, is the usual narrow, acutely angulated band; a large apical spot of gray hair occupies the hindmost fifth of the surface, and extends along the suture higher than on the margin; its anterior outline is angulated, and is transversely truncate at the middle.

In badly preserved specimens the apical spot sometimes appears to be a subapical band, from the rubbing off of the hairs near the tip.

67. *Cupes serrata*, fusco-testacea, piceo-marmorata, squamulis cinereis nigrisque variegata, fronte concava, thorace transverso, lateribus parallelis, angulis anticis acutis divaricatis, apice ad medium late breviter producto, confertim punctato, canaliculato, antice posticeque transversim impresso, elytris cylindricis, foveis seriatis quadratis cancellatis, lateribus versus apicem spinulis acutis armatis serie duplici positis; oculis parvis, antennis corpore duplo brevioribus, cinereo nigroque annulatis. Long. .43—.82.

East of Fort Colville, at Sinyak water depot, and at Camp Kootenay. The variation in size of this remarkable species is very great. Besides the spiculæ on the lateral margin, and on the extreme inflexed margin of the elytra, a few are visible on the seventh interstitial line near the tip. The blackish markings are scattered along the interstitial line and a broad band behind the middle is also seen.

It will probably be found on dissection that the characters separating our three species of *Cupes* will warrant them in being considered as belonging to distinct genera. The external characters are very marked; thus in *C. serrata* the head is not tuberculate behind, and is deeply concave between the antennæ, which are distant, only one-half as long as the body, and somewhat serrate; the eyes are small. The mentum appears larger and more prominent than in the other two species.

In *C. capitata* the head has a very deeply impressed line between the eyes, and is divided behind into four tubercles; the antennæ are about two-thirds the length of the body, stout, but not serrate; the eyes are small.

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In *C. concolor* Westwood, (*cinerea* Say, *trilineata* Mels.) the head is not tuberculate behind, the antennæ are less distant, longer than the body, and filiform, and the eyes are very large.

68. *Philoxylon alutaceum*, elongatum fusco-testaceum, pube helva sericea brevi dense vestitum, elytris alutaceis, vix distincte punctulatis. Long. .20.

California; Mr. A. Murray. Differs from *P. convexifrons* Lec. (*Anobium conv.* Mels.) by the more elongate form, and by the elytra not being distinctly punctulate; in *P. punctulatum* Lec. (*Anobium punct.* Lec.), they are more strongly and less densely punctulate than in *P. convexifrons*.

The genus *Philoxylon* was established by me (Class. Col. N. Am. 205), on the two species just named, which differ in many respects from *Anobium*. It will be recognized by the prothorax not being excavated beneath for the reception of the head; the prosternum before the coxæ is very short, but distinct; the anterior coxæ are contiguous, as are also the middle ones; the tarsi are moderately long, the fifth joint is not flattened, and is as long as the two preceding united; the claws are slender. The antennæ are long, the joints 3—7 are nearly equal, and the 8—11 are together somewhat longer than all the others united.

69. *Eleodes obtusa*, elongata, nigra, capite thoraceque confertim punctatis, hoc ovato, latitudine paulo brevior, lateribus rotundatis, postice obliquis, angulis posticis obtusis, spatio parvo lævi utrinque ad medium notato, elytris postice oblique attenuatis valde declivibus, basi truncatis humeris obtusis, granulis punctisque intermixtis vix seriatim positis; femoribus anticis subtus obtuse angulatis. Long. .60.

California; Mr. Murray; one male. Quite distinct by its characters from all others known to me. The prosternum is slightly prominent behind. The elytra are punctured towards the suture, but behind and at the sides the punctures are replaced by oval elevations of moderate size, which are arranged in rows, though not very distinctly. The epipleural margin is not visible from above, and the humeral angles are not produced.

70. *Eleodes inculta*, nigra, subopaca, capite thoraceque sat dense punctatis, hoc latitudine paulo brevior, lateribus valde rotundatis postice subito breviter sinuatis, angulis posticis obtusis prominulis, basi late rotundato, elytris ovalibus thorace sesqui latoribus, apice attenuatis valde declivibus, humeris late rotundatis, dorso deplauatis punctis granulisque parvis inordinatis insculptis, granulis versus latera breviter piliferis; femoribus anticis muticis, antennis apice parum incrassatis. Long. .57.

Island of Santa Barbara, Mr. C. M. Bache. More nearly related to *E. producta* than to any other known to me; the thorax is, however, less broad, and less rounded on the sides, the humeri are broadly rounded and the epipleural margin is not at all visible from above; the elytra are also more granulated and less punctured, and the antennæ are more slender.

71. *Eleodes hirsuta*, nigra pilis elongatis nigris erectis villosa, capite thoraceque opacis, confertim (hoc fortius) punctatis, thorace latitudine vix brevior, lateribus rotundatis angulis posticis obtusis, elytris ovalibus, subnitidis, confertim inordinatim punctatis, versus latera et apicem submuricatis, femoribus anticis muticis, antennis extrorsum paulo incrassatis. Long. .37— .42.

Mas elytris thorace paulo latoribus, latitudine fere duplo longioribus. Femina elytris thorace plus sesqui latoribus.

Great Salt Lake Desert. The prosternum is slightly prominent behind. From the long hairs with which this species is covered it presents very much the appearance of *Amphidora nigropilosa* Lec.; the anterior tarsi are, however, not at all dilated, and otherwise it presents the characters of *Eleodes*.

72. *Helops Bachei*, elongatus, nigro-piceus, ænescens, capite thoraceque dense fortiter aciculatim punctatis, hoc parum convexo, latitudine paulo breviori, rotundato, ante basin vage arcuatim impresso, elytris striato-punctatis, interstitiis planis disperse subtiliter punctatis postice tuberculis minutis punctigeris uniseriatim ornatis, metasterno brevi. Long. '34—'50.

Island of Santa Barbara, Mr. C. M. Bache. Very distinct from all the other species known to me; the small tubercles of the elytral intervals in large specimens may be seen almost to the base, in small ones, however, they are sometimes almost entirely wanting, and may be traced only very near the tip. Each little elevation is marked with a point somewhat larger than the scattered punctures of the intervals. The antennæ are slender, very slightly thickened externally. The under surface of the prothorax is densely aciculate; the metasternum is strongly, the abdomen more finely punctured. The male has three joints of the anterior tarsi moderately, and of the middle tarsi very slightly dilated.

73. *Helops pernitenis*, nigro-æneus nitidissimus, subtus nigro-piceus, capite confertim punctato, thorace latitudine plus sesqui breviori, antice posticeque truncato, lateribus rotundatis, margine fortius depresso et reflexo postice haud latiore, disperse punctato, elytris oblongo-ovalibus convexis, fortiter marginatis, striis profundis subpunctatis, interstitiis planis vix punctulatis, metasterno brevi. Long. '40.

Oregon. Related to *H. lætus* *Lcc.*, but differs by the thorax being less densely punctured, and by the posterior angles being much more obtuse; the sides curve equally before and behind the middle, and the depressed margin is not wider at the base. The sides of the prothorax are finely and densely striate beneath; the metasternum is strongly punctured; the abdomen is more finely punctured, and is rugous at the sides. Three joints of the anterior tarsi are moderately, of the middle tarsi very slightly dilated in the male.

74. *Helops convexulus*, nigro-piceus, ænescens, capite confertim, thorace sat dense punctato, hoc convexo latitudine paulo breviori, antice posticeque truncato, lateribus rotundatis, angulis obtusis rotundatis, elytris ovalibus, convexis, striis subtilibus punctatis, interstitiis planis, pedibus rufo-piceis. Long. '24.

Bitter Root Valley, Rocky Mountains. Lieut. Mullan's Expedition. The sides of the prosternum beneath are densely striate; the rest of the under surface is punctured, and the sides of the abdomen are besides finely rugous.

75. *Cibdelis Bachei*, niger opacus, thorace latitudine vix breviori, antice magis angustato, lateribus rotundatis postice subsinuatis, angulis posticis rectis, parum convexo, tuberculis parvis scabro, elytris lateribus rotundatis, thorace sesqui latioribus, striis subtilibus punctatis, interstitiis tuberculis parvis dispersis. Long. '65.

Island of Santa Barbara, California; Mr. C. M. Bache, to whom I take great pleasure in dedicating this fine species, as a slight acknowledgment for the labor bestowed in making collections on the islands near the coast of California.

Larger and broader than *C. Blasehki*, and totally distinct in its sculpture. The epistoma is broadly emarginate and nearly conceals the labrum, while in *C. Blasehki* it is truncate, and the labrum is more prominent; the mentum is broader in front, and feebly emarginate, and the hind feet are more widely separated. I am not disposed to regard these differences as generic.

76. *Uloma longula*, piceo-rufa, elongata, nitida, capite confertim subtiliter punctato, fronte late et profunde transversim impressa, thorace latitudine breviori, antice paulo angustato, lateribus anguste marginatis, sat dense medio subtilius punctato, elytris striis haud profunde punctatis, interstitiis planis obsolete punctulatis. Long. '37.

California, Mr. Murray. Of the same form as *U. ferruginea* Say, but much larger, with the striæ of the elytra much less strongly punctured, and the intervals only very obsoletely punctulate.

75. *Meloe opaca*, elongata, nigra, opaca, capite medio parce lateribus et postice sat dense punctato. linea longitudinali obsolete impressa, fronte utrinque transversim impressa, thorace latitudine breviori ovato, basi emarginato, sat dense punctato, obsolete canaliculato, dorso vage bifoveato, elytris dense sat fortiter intricato-rugosis, abdomine subtiliter rugoso. Long. '75.

One specimen, Mendocino City, Mr. A. Agassiz.

78. *Meloe barbara*, æneo-nigra, subnitida, capite disperse punctato, thorace oblongo, ad apicem rotundatim angustato, basi emarginato, dorso planiusculo, disperse punctato, obsolete canaliculato, antice vage bifoveato, ad basin impresso, elytris valde convexis, parce rude haud profunde rugosis, abdomine alutaceo-rugoso, antennis (♀) medio parum incrassatis. Long. '60.

Island of Santa Barbara, Mr. C. M. Bache.

79. *Lytta dolosa*, minus elongata, metallescens opaca (nigro-cyanea, olivacea, vel pistacea cupreo-tincta), capite parce punctato, postice canaliculato, gutta frontali flava, basi truncato angulis posticis rotundatis, thorace ovali, latitudine subbrevisiore, punctis parvis adpersis, subtiliter canaliculato, dorso obsolete bifoveato, elytris thorace fere duplo latioribus dense rugosis et punctulatis, antennis elongatis nigris, extrorsum moniliatis paulo incrassatis, tibiis posticis calcari interno tenui acuto, externo dilatato, obtuso. Long. '42—'58.

California, Mr. Murray; Mendocino City, Mr. A. Agassiz. Very variable in color, sometimes of a greenish bronze, sometimes almost black, with a bluish brassy tinge. The smaller specimens resemble in appearance *L. smaragdula* Lec., but are at once distinguished by the outer spur of the hind tibiæ being much broader and more obtuse.

80. *Tragosoma Harrisii* Lec. A specimen of this species was found by Mr. Gibbs, east of Fort Colville. It probably extends its range across the continent in more northern latitudes.

81. *Pogonocherus oregonus*, niger, setis nigris elongatis erectis adpersus, thorace vix calloso, spina laterali brevi obtusa, elytris parallelis punctis magnis parvis, antice confusis postice seriebus paucis ordinatis, fascia lata antica trienteque postico cinereo-pubescentibus, penicellis parvis brevibus triseriatis ornatis; antennis cinereo-annulatis. Long. '28.

East of Fort Colville, Mr. Gibbs. The long hairs with which this species is clothed, and the three rows of bunches of black pubescence seen on the elytra, cause it to resemble in appearance *P. penicellatus* Lec., but the thorax has no very distinct elevations, and the lateral lines are less prominent. The elytra are not gradually narrowed behind, have no costæ, and the bunches of black hair are very short. The anterior band occupies one-third of the surface, except a basal broad triangular space; the punctures not being covered with hair appear black.\*

\* It may here be proper to state that *Amphionycha subarmata* Lec. (Col. Kansas, 22) from Niagara, on examination of perfect specimens, is found to have the ungues simple, and in fact to belong to the genus *Eupogonius* Lec. The resemblance in appearance to *Amphionycha* is most remarkable, though I have since observed that the genera allied to *Saperda* have the eyes finely granulated, while in *Liopus*, *Eupogonius*, *Pogonocherus* and all allied forms the lenses are much larger, thus causing the eyes to appear more coarsely granulate. A similar difference in structure obtains among the genuine *Cerambycidae*, and by regarding it, many groups may be circumscribed with great precision. I hope shortly to make known some modifications in the natural arrangement of these tribes suggested by this discovery.

82. *Leptura cribripennis* Lec. Two specimens collected by Dr. W. A. Hammond in the Black Hills, have precisely the form and sculpture of this species, but the elytra are black, with the base red; another from Oregon has the elytra entirely black. Finding no differences but those of color, I not only believe these to be merely varieties, but also suppose that *L. canadensis* Fabr. and *L. erythroptera* Kirby (nec Germ.) are corresponding varieties of another species; the entirely black variety of our Eastern species is as yet unknown.

83. *Leptura cubitalis*, elongata, nigra, parce subtiliter cinereo-pubescentis, capite thoraceque confertim punctatis, hoc convexo, subcanaliculato, lateribus valde rotundato, antice angustato, fortiter constricto, basi modice constricto, linea dorsali laevi nitida, elytris parallelis apice subtruncatis, sat dense postice subtilius punctatis, antennis tenuibus piceis, basi rufis, pedibus anticis rufis, femoribus apice, tibiis apice externo, tarsisque nigris. Long. '35.

Sau Mateo, California, A. Agassiz. Belongs to the same division as *L. sphaericollis* Say, *L. vibex* Newman (*nitidicollis* Horn, Pr. Ac. 1860, 570) and *L. aurata* Horn.\*

84. *Leptura fasciventris*, nigra, fulvo-pubescentis, capite thoraceque confertissime punctatis, opacis, hoc convexo subcanaliculato campanulato, apice valde, postice modice constricto, lateribus sinuatis, elytris flavis (♀) subparallelis, thorace fere duplo latioribus apice subtruncatis, dorso antice subdepressis, modice postice subtilius punctatis, flavis fasciis duabus trientate postice nigris, maculaque rotundata utrinque ante apicem flava ornatis; abdomine flavo, plus minusve nigro-fasciato, pedibus rufo-flavis, femoribus crassiusculis; antennis nigro-fuscis, plus minusve testaceo-annulatis, vel testaceis, nigro-annulatis, basi nigris. Long. '40—'47.

California, Mr. A. Murray; found also in Oregon. Belongs to the same group as *L. crassipes* Lec., *xanthogaster* Lec., *tibialis* Lec. and *rufula*. The first band is oblique towards the suture, and is about  $\frac{1}{4}$  from the base; the second is transverse, situated about the middle; it is broad externally, but scarcely reaches the suture; the outer margin is black from the 2d band, and the suture from the first band. The abdomen is yellow, the base of each segment, especially at the sides, is black, but in one specimen this is observed only on the first and second segments.

85. *Leptura dolorosa*, robusta, nigra opaca, subtiliter cinereo-pubescentis, capite confertim punctato canaliculato, thorace antrorsum sensim angustato, lateribus late rotundatis, basi incurvis, apice valde constricto, basi profunde transversim impresso et depresso, disco parum convexo, profunde canaliculato, parce basi dense punctato, elytris planiusculis, apice oblique intus truncatis, subparallelis, sat dense postice subtilius punctatis. Long. '58.

East of Fort Colville, Mr. Gibbs. Related more nearly to *L. biforis* than to any other known to me, though, from its black color, very different in appearance. The disc of the thorax is broadly flattened each side behind the middle.

86. *Leptura (Stenura) carbonata*, elongata, nigra subnitida, subtiliter nigro-pubescentis, capite canaliculato, sat dense fortiter punctato, thorace parum convexo, antrorsum sensim angustato, apice constricto, basi fortiter impresso et depresso, linea dorsali angusta laevi, dorso parce, lateribus sat

\* To the same division belongs the following species from Lake Superior:

*L. pedalis*, elongata, nigra, parce fusco-pubescentis, capite thoraceque dense punctatis, hoc convexo, subcanaliculato, lateribus rotundatis, antice angustato apice valde constricto, basi modice constricto, linea dorsali tenui laevi, elytris parallelis, apice subtruncatis, sat dense postice minus fortiter punctatis, antennis nigro-piceis, articulis 3—11 basi testaceis, pedibus rufo-testaceis. Long. '40.

In one specimen the middle thighs are darker.

dense fortiter punctato, utrinque vage deplanato, angulis posticis laminatis, elytris parallelis apice subtruncatis, modice, postice subtiliter punctatis. Long. .73.

Washington Territory. Allied to *L. nigrella* Say, but the head and thorax are not confluent punctured, the elytra are parallel, and are only slightly truncate at tip, and not emarginate as in *L. nigrella*.

87. *Toxotus flavolineatus* Lec. A variety of this species in which the elytra are entirely black, is found in Oregon.

88. *Argaleus lituratus*; *Pachyta liturata* Kirby. Specimens collected in various parts of Washington Territory prove that *A. nitenis* Lec. is merely a variety of this species; the elytra vary from being entirely pale to entirely black.

89. *Aemæops vincta*, elongata, nigra, subtiliter fusco-pubescentis, capite thoraceque dense punctatis, hoc latitudine haud brevior, convexo, canaliculato, antice et postice profunde constricto, lateribus obtuse angulatis, elytris fortiter postice subtilius punctato, a basi perparum angustatis, apice subtruncatis, vittis duabus flavis utrinque ornatis sæpe obsoletis, femoribus anterioribus rufis apice nigris, posticis nigris basi rufis. Long. .47—.53.

Bitter Root Valley, Lieut. Mullan's Expedition; also found in Oregon. Narrower than *A. dorsalis* Lec., (Col. Kansas, 21,) with the impressions of the thorax much stronger, and the sides more distinctly angulated.

90. *Aemæops gibbula*, nigra, fusco-pubescentis, capite sat dense, thorace parcius punctato, hoc campanulato, apice fortiter constricto, postice transversim impresso, dorso late depresso utrinque subgibboso, linea dorsali lævi, angulis posticis rotundatis prominulis, elytris fortiter postice subtiliter punctatis, (♂) a basi angustatis, apice truncatis, nigro-fuscis, vel obscure rufis, sutura vittaque submarginali obscuris. Long. .35.

Washington Territory, Mr. Gibbs. Allied to *A. proteus*, but the elevations of the thorax are much less prominent, and the flattening of the disc is less decided. Specimens will undoubtedly occur having the elytra pale without any dark vittæ. When the elytra are not entirely dark colored, the base of the thighs is testaceous.

91. *Stenopterus fuscipennis*, niger, subtiliter pubescens, thorace latitudine longiore, antice angustato, lateribus late rotundatis, apice et basi impresso, fortiter punctato, linea dorsali brevi elevata callisque duabus elongatis lævibus, elytris abdomine parum brevioribus longe subulatis, dorso planis, fusco-testaceis, haud dense punctatis, punctis hic inde seriatis, tibiis anterioribus basi testaceis, pedibus posticis flavis, femorum clava tibiæ apice tarsisque nigris. Long. .40.

San Mateo, California, Mr. A. Agassiz. The hind tibiæ are slightly bent, and are roughened with small elevations.

92. *Arhopalus lutosus*, niger, pube brevi virescenti-ochrea undique dense tectus, thorace rotundato, latitudine haud brevior, elytris apice oblique truncatis angulo externo subacuto, antennis pedibusque rufis. Long. .46.

Kansas, near the Rocky Mountains.

93. *Crossidius ater*, ater opacus, griseo-pubescentis, thorace latitudine brevior convexo rotundato, rude et dense punctato, pilis longis pallidis villosis, elytris confertim antice fortius punctatis. Long. .62.

Utah, Mr. E. T. Cresson. Resembles in form *C. testaceus* and *C. humeralis* Lec., but quite different by its color.

94. *Crossidius pulchellus*, longior, niger, pallide pubescens, thorace latitudine paulo brevior, rotundato, rude punctato, lateribus postice paulo concavis, pilis longis villosis, elytris fortiter ad apicem subtilius punctatis, pallidis, margine basali ad humeros latiore, plagaque communi maxima pos-



tica oblonga nigris, abdomine rufo, segmentis duobus primis fuscis apice rufis. Long. '37.

Bitter Root Valley, Mr. Ulke. The large spot of the elytra extends two-thirds the length; its anterior outline is angulated at the suture, and slightly concave each side; the lateral outline is straight, and reaches the apex, which is abruptly rounded; the suture is retracted and presents a small tooth.

95. *Clytus mormonus*, niger, parce cinereo-pubescentis, capite scabro, carinis duabus frontalibus notato, thorace ovali latitudine longiore, convexo, scabro, elytris subtilius punctatis et rugosis, apice singulatim rotundatis, guttis pluribus parvis cinereo-pubescentibus in fascia ad medium alteraque ad dodrantem digestis; femoribus posticis abdomine paulo brevioribus. Long. '60.

Utah, Mr. E. T. Cresson. The specimen before me has lost nearly all the pubescence, but the species can be readily recognized by the characters above given. The thorax is regularly oval, equally narrowed at base and apex, densely rugosely punctured, without any elevations.

96. *Callidium* (*Phymatodes*) *Agassii*, robustum, atrum opacum, thorace rude punctato, transverso, lateribus valde rotundatis, elytris basi truncatis, thorace lateribus, ante medium rude, pone medium parce sat fortiter punctatis. Long. '67.

San Mateo, California, A. Agassiz. The elytra behind the middle are still more destitute of lustre than the rest of the surface. The anterior coxæ are separated by the very narrow prosternum. The antennæ are stout, scarcely more than half the length of the body.

97. *Donacia californica*, supra virescente-ænea nitida, thorace quadrato, latitudine paulo brevior, lateribus rectis postice paulo convergentibus, angulis omnibus prominulis, tuberculo antico male definito, postice transverse fortiter, antice modice transversim impresso, dorso parum convexo, obsolete punctulato et rugoso, canaliculato, ante medium transversim impresso, elytris thorace duplo lateribus, planiusculis, apice subtruncatis, punctis inauratis confertis striatis, interstitiis subtiliter rugosis, subtus plumbea. Long. '45.

California, Mr. Murray. Resembles in form and characters *D. proxima* Kirby, but differs by the color and by the thoracic tubercles being less prominent. The upper surface is also not so smooth and shining.

98. *Coscinoptera vittigera*, oblonga, subcylindrica, aeneo nigra, cinereo-pubescentis, thorace latitudine vix brevior, antrosum sensim angustato, subtilius punctato, vitta dorsali lævi, elytris confertim punctatis, vitta lata rufa a basi ad apicem extensa ornatis, humeris obscuris. Long. '23.

Bitter Root Valley, Mr. Pearsall.

99. *Pachybrachys nalis*, oblongus, convexus niger, subopacus, cinereo-pubescentis, capite thoraceque confertim subtiliter punctatis, hoc vitta dorsali lævi, margine laterali testaceo, elytris punctatis subrugosis, hic inde substriatis, lateribus ante medium, apiceque testaceis; pygidio flavo-bimaculato, abdomine apice testaceo, pedibus nigro-flavoque variegatis. Long. '20.

California, Mr. A. Murray.

100. *Pachybrachys viduatus* Suffr.; (*Crypto. bivittatus* Say). A singular variety of this species from California was sent me by Mr. Murray. The middle and posterior spots are united with the vitta, so that the elytra are pale, with the suture and narrow lateral and apical margin, a small humeral spot, and a very broad stripe extending nearly to the tip black.

101. *Chrysomela* (*Phædon*) *oviformis*, ovalis convexa, supra ænea; cupreo-micans, thorace lateribus distincte, medio fere obsolete punctato, elytris punctis mediocribus striatim digestis, interstitiis parce obsolete punctulatis. Long. '15.

East of Fort Colville, Mr. Gibbs. Less rounded and more convex than our

common *C. viridis*, with the punctures in the rows of the elytra rather larger, and the interstices less finely rugous. The under surface is metallic black, the legs black, with the outer half of the tibiæ and tarsi obscure testaceous in one specimen; in another they are entirely black.

102. *Chrysomela (Phædon) prasinella*, supra obscure viridi-ænea, ovalis modice convexa, thorace aequaliter modice punctato, elytris punctulatis, punctis vix majoribus striatim digestis. Long. '18.

Oregon, Mr. Murray. Less convex than the preceding, and less rounded than *C. viridis*; differs from both by the middle of the thorax being scarcely less punctured than the sides, and the intervals between the rows of punctures of the elytra being covered with scattered punctures scarcely smaller than those of the rows.

103. *Haltica reëticollis*, elongata, supra æneo-fusca, pube flava subhispida, thorace latitudine paulo longiore, lateribus serrulatis late rotundatis, angulis posticis rectis, anticis prominulis, modice convexo, grosse punctato, sulco basali transverso profundo, elytris oblongis, thorace haud latioribus striis antice fortiter postice subtiliter punctatis, interstitiis punctulatis; subtus nigra, antennis pedibusque rufis. Long. '12.

California, Mr. Murray. The western representative of our *H. forticornis* Ill. (? *copulina* Fabr.), though very different from that species.

104. *Haltica (Crepidodera) seminulum*, breviter ovata, convexa, nigro-ænea, cinereo-pubescent, capite convexo fere lævi, thorace transverso, convexo, antrorsum angustato, basi medio producto, fortiter parce punctato, sulco basali transverso profundo, elytris ante medium dorso impressis, striis e punctis majusculis compositis, interstitiis fere lævibus; subtus nigra, antennis pedibusque flavo-testaceis, femoribus nigro-piceis. Long. '09.

California, Mr. Murray.

105. *Haltica (Crepidodera) mancula*, ovata, convexa, nigro-ænea, glabra, capite parce grosse punctato, thorace transverso, convexo, antrorsum angustato, angulis anticis rotundatis paulo prominulis, parce punctato, sulco transverso postice fere obliterated, striola brevi profunda utrinque notato, elytris striato-punctatis, punctis antice majoribus, apice obscure testaceis, subtus nigra, antennarum basi, tibiis anticis apice, tarsisque piceis. Long. '10.

East of Fort Colville, Mr. Gibbs. Remarkable for the usual transverse furrow of the thorax being almost entirely wanting.

106. *Galleruca carbo*, atra opaca, breviter cinereo-pubescent, thorace transverso, antrorsum angustato, lateribus rotundatis, angulis anticis paulo prominulis, punctato, subcanaliculato, dorso vage bimpresso, elytris parce punctatis, sulco marginali lato haud profundo. Long. '20—'22.

East of Fort Colville, Mr. Gibbs. Resembles *G. sagittaria*, but is entirely black, and the thorax is more rounded on the sides.

107. *Triplax antica*, elongata ovalis, nigra nitida, capite thoraceque haud dense punctatis, hoc transverso antrorsum paulo angustato, lateribus parum rotundatis, elytris subtilius striato-punctatis, interstitiis vix obsolete punctulatis, basi anguste indeterminate rufis, antennis palpis pedibusque rufis, illis clava nigra. Long. '16.

Sinyak water depot, Mr. Gibbs. Totally distinct from any other of our elongate species, which constitute the genuine group of the genus.

108. *Hippodamia spuria*, ovalis, longiuscula, thorace nigro, limbo omni angusto lineisque duabus discoidalibus albis, elytris pallide fulvis, macula communi scutellari elongata, altera humerali, tribusque utrinque pone medium 2, 1, positis nigris, sæpe deficientibus, his nonnunquam varie confluentibus, angulo suturali rotundata, subtus nigra epimeris mediis et posticis pallidis. Long. '20.

Oregon, Mr. A. Agassiz. This species has the size and form of our common *H. parenthesis*, but the thorax of *H. convergens*. The elytra are more elongate oval in form than in either, and more obtusely rounded at tip; the apical angle is also not at all acute, but on the contrary quite rounded.

The spots of the elytra vary greatly; the scutellar elongate spot is sometimes prolonged on the sutural margin for two-thirds the length; the first and second, or the second and third of the posterior spots are connected sometimes as in varieties of *H. parenthesis*, and specimens will undoubtedly be found in which all three are united to form an arcuated spot. It is also probable that *H. sinuata* *Muls.* (Cocc. 1011) is an extreme form of this species, having all the spots united into a sinuous vitta; sometimes the spots are entirely wanting. The pectoral and abdominal curved lines are obsolete, and it consequently belongs in the same group with *H. convergens*.

### Description of a new Mexican Bat.

BY HARRISON ALLEN, M. D.

In 1842, Prof. Gray described, in the *Ann. and Mag. of Nat. Hist.*, a new genus of bats, which he called *Centurio*, and gave the diagnosis of a new species,—*C. senex*. Both of these were afterwards introduced, with a plate and extended description, in the *Zoology of the Voyage of the Sulphur*, p. 27. This was the first notice given of a well marked group of Cheiroptera inhabiting the tropical regions of America.\* Since that time, Lichenstein and Peters† have published an account of a new species—*C. flavogularis*—coming from Cuba; and M. de Saussure‡ has added a third, under the name of *C. mexicanus*.

A short time since, the author obtained from the collection of the Smithsonian Institution two bats, sent by Dr. Sartorius from Mirador, Mexico. One of these was determined, from the descriptions furnished by M. de Saussure, to be the *C. mexicanus* of that author. The other was an animal resembling the members of the genus in question in many particulars, but differing so markedly in others as to render a special description necessary.

The head in its general expression and arrangement of the facial pleats resembles that of the other species. The greater and lesser transverse frontal ridges are present, the latter being less distinct than in the original plate of Gray, and much less so than in the figure of Lichenstein and Peters. The mesial callosity between the nostrils, the nostrils themselves, the warts, setæ and oval crenations, are all similar in extent and relative proportions one to the other, as in other *Centuriones*. The ear, however, presents some points of difference. The "hatchet-shaped" internal lobe is of the same shape, but possesses longer and thicker hair. The auricle proper is similar, while the tragus is much thicker on the inner than on the outer side, which thickness exceeds that of *C. mexicanus*; and the external lobe is more acute, and has upon its summit a minute, well-defined knob.

But the great point of variance consists in the development of the corrugations beneath the chin. These in the known species are but leathery bands, three in number, running from one side of the neck to the other,—the lower one being the largest and covered with hair. In our animal, in addition to the three above noticed, there are two smaller ones, placed anterior to the rest. On a comparison being instituted between these rugæ, they were found to differ greatly in the degree of their development. Thus, while the first pli-

\* Prof. Gray was in doubt as to the nativity of his species, from the fact that bats collected both from Amboina and South America were contained in the same bottle. There can be but little doubt, however, that his animal came from the latter country.

† *Abhandl. der Akad. der Wissenschaften zu Berlin*, 1854, p. 81, pl. 1.

‡ *Rev. et Mag. Zool.*, 1860, p. 378.

cation commences from a small wart placed midway between the eye and mouth, and extends downwards and forwards to join its fellow of the opposite side in a median callosity, it in our animal is sufficiently large to cover in the angle of the mouth. The second fold commences at the external lobe of one ear, and terminates at the corresponding point of the opposite ear. It possesses in the centre a little pit, which is probably glandular, and corresponds to the cervical sac of Taphyzous. This fold in our animal is less distinct than in others, and terminates in the third plication.

It is in the last fold that the chief peculiarity of the new form is discovered. Instead of being but a slight elevation of furred skin, it forms a large hairy mask, which, when elevated, hides the face. It is naked within, furred without. The lower and middle parts are sparsely covered with soft hair, while the upper portion possesses two thick clumps of fine fur, one on either side of the central line. This development of the skin gives the animal a very grotesque appearance. The entire arrangement might with propriety be compared to an ancient vizor surmounted with rosettes.

The thumb is large, the basal joint smallest. It is about the same size as that of *C. mexicanus*; larger than that of *C. flavogularis* and *senex*, judging from their respective figures. The wing membranes have the same beautiful translucent lines upon them, and in the same positions. That portion between the first and second figures is free from pigment. The interfemoral membrane is excised and hairy. No differences are observed in the skull, either in the dentition or contour.

We hesitate in defining the position of this bat. Are we to consider it a new genus, or only a new species of a known one? It would, indeed, seem that such a marked peculiarity would constitute a sign of more than specific value, yet the general conformation of the animal in all other respects to a common type prevents us in exalting it to a position of generic importance. The dentition, the shape of the skull, the markings of the membranes, the facial lines, and even the whitish shoulder tufts, are common to all; and, in fact, the unusual growth of the cervical plicæ and some minute differences in the accessories of the ear, are the only points upon which a generic distinction can be based. So while believing that the differences between this species and any one of those belonging to Centurio much greater than those which exist between any two of the species of that same genus, we at the same time do not consider that the mere excessive development of a portion of skin is sufficient to form a genus in mammalia. We, therefore, taking a middle course, insert our new bat in the following table, thus:—

*PHYLLOSTOMIDÆ* Geoff.

CENTURIO Gray.

*C. senex*, Gray.

*C. flavogularis*, L. and P.

*C. mexicanus*, De Sauss.

Subgen. TRICHOCORYTES nob.

*C. McMURTRII*,\* n. s.—General color russet-brown with an inclination to fawn. The hair of the back is thicker than that of the belly, and is tricolored, the base being plumbeous, the centre paler, and the tip subrufous with fawn. The arms and interfemoral membrane are hairy; that of the former with thick and short, that of the latter with long and scanty hair, extending down on the back of the feet. The fur of the belly has a tendency to fawn color, especially near the pubis, where there is a distinct line of this hue. The three shades noticed

\* After Prof. McMurtrie, of the Philadelphia High School.

on the back are absent on the belly. The under surfaces of the humerus and interfemoral membrane are also hairy, but less so than above. The mask-tufts are of a delicate fawn grey, while the shoulder tufts are white.

*Measurements.*

Length from snout to coccyx.....	2·3
“ of interfemoral membrane.....	0·5
“ of outer border of ear.....	0·7
“ of forearm.....	7·0
“ of first joint of thumb.....	0·2
“ of second joint of thumb.....	0·4
“ of third finger.....	3·3
“ of fifth “.....	2·3
“ of inferior extremity.....	1·2
Expanse of wing membranes.....	9·0

*Habitat.*—Mirador, Mexico.

**Note on the Bartram Oak (*Quercus heterophylla*.)**

BY S. B. BUCKLEY.

The Bartram Oak (*Quercus heterophylla* *Mx.*) has long been regarded by most American Botanists as a hybrid. Accompanied by Dr. Procter, Editor of the Journal of Pharmacy, I lately went to Mount Holly, near Burlington, in New Jersey, to see an Oak with leaves of varied forms, many of which correspond in shape with the figure of the Bartram Oak in Michaux's *Sylva*. It is less than one-fourth of a mile from the depot at Mount Holly, in a thicket near several willow oaks (*Quercus phellos*), of which it is plainly one. It has all the characteristics of body, limbs and acorns, peculiar to the willow oak. Many of its leaves also have the ordinary form of *Quercus phellos*. Michaux, in his description of the *Q. heterophylla*, says that several young plants of the Bartram Oak have been placed in the public gardens to insure the preservation of the species. One of these, which was grown from an acorn of the original Bartram Oak, was planted in the Bartram Garden. Col. Carr, who succeeded Bartram in the ownership and possession of the garden, showed this tree to Mr. Meehan, of Germantown, who had charge of the garden during two years. With Mr. Meehan, a few days since, I visited this tree. It also is a *Quercus phellos*. It has very few lobed leaves, indeed there is scarcely one in fifty of them lobed.

In Mr. Durand's herbarium are specimens of *Quercus phellos* with lobed leaves like the Bartram Oak, which he received from Columbia County in this State, where such forms of the willow oak are said to be quite common along the banks of the Susquehanna. The Bartram Oak is not a hybrid, but a mere form of *Quercus phellos*, which like most American oaks, varies greatly in the shape of its leaves.

Since writing the above I have seen a specimen from the original Bartram Oak, which has both lobed and entire leaves, showing beyond question that it is a form of *Q. phellos*. This specimen is now in the general herbarium of the Academy of Natural Sciences at Philadelphia.

**Description of a new species of North American Grouse.**

BY GEORGE SUCKLEY, M. D., U. S. A.

PEDIOCÆTES KENNICOTTI, Suckley. (N. S.)

Kennicott's Sharp-tailed Grouse; Arctic Prairie Fowl. *Tetrao Kennicotti*, Suckley, Mss.

1861.]

*Sp. Ch.* In size, general form and plumage, greatly resembling the *Pediocætes phasianellus* (Linn.) BAIRD, but differing as follows: In having a broad, bright orange or red patch of naked skin over the eye; by the constriction of the white markings on the feathers about the neck, anterior parts of the breast and shoulders. The dark markings being thus rendered larger, give the bird a general darker hue, which the eye instantly notices. For the opposite reason, specimens of the true *P. phasianellus* at first glance seem very light colored. The feathers of the latter are finely mottled, and the larger spot markings on the neck and breast generally V-shaped. The dark markings on the scapulars, neck, back and tail coverts, are in the more southern species *light brown*, more or less mottled.

In the *P. Kennicotti* there is an excess of black on the feathers of the neck and fore-breast, while the spots of white on the wing coverts and scapulars are larger, on a ground of a *uniform dusky black*, free from fine mottling.

The white spots on the middle of the long anterior feathers of the breast are restricted so as to be very nearly nothing but shaft lines. Each feather has also a narrow border of white. Feathers from the same region on *P. phasianellus* have the white in excess.

*Habitat.*—Arctic America, near Great Slave Lake. Obtained by Robert Kennicott, Esq., through Mr. Clark, from Fort Rae and Big Island in the Hudson's Bay Company's Territory.

This is a strongly marked species, readily distinguished from the Sharp-tailed Grouse of the United States when a comparison of skins is made. In a few words, this bird may be described as nearly black and white; with scarcely any of the ferruginous and light ochry colors observable in the *P. phasianellus*—what little of the ferruginous or brownish yellow exists being found mostly on the back posteriorly and rump.

It might be supposed that Douglas, in his "Observations on some species of the *Genus Tetrao*," &c. published in the Transactions of the Linnæan Society, vol. xvi. 1833, (read Dec. 16th, 1828), had described this species under the name of *Tetrao urophasianellus*. Indeed, Sir John Richardson so understood it when he said "on examination, Mr. Douglas's 3 specimens in the Edinburgh Museum appeared to me to be merely the young of the Sharp-tailed Grouse with ferruginous plumage." (Richardson, in F. B. A., 1831, 861.) Douglas's description of *T. urophasianellus* was based on birds obtained west of the Rocky Mountains, and found in the same localities as the preceding kind, (*T. urophasianus*, or sage fowl,) "with whom they associate and seem to live in harmony." "The sage fowl," he says, "is plentiful throughout the barren arid plains of the river Columbia, also in the interior of North Carolina. They do not exist on the banks of the river Missouri; nor have they been seen in any place east of the Rocky Mountains." Further discussion regarding the locality whence Douglas's specimens were obtained is scarcely necessary. The following extract from characters assigned to the species by him, however, will set the question at rest:

"Head, neck and back *brownish gray*, waved with bars of a *reddish and darker tinge*." This description by no means applies to specimens of the species now described for the first time; one of the principal features of which being the absence of brownish gray and reddish tints.

Specimens of the true Sharp-tailed Grouse from the Columbia region, and North California, are contained in the Smithsonian collection. They agree remarkably well with each other, and with those from the Rocky Mountains, Missouri river and Minnesota—all being tinged with brown ferruginous and ochry, and consistently disagreeing with the specimens and species described as *P. Kennicotti*.

For the foregoing reasons we believe we are justified in the following deductions: 1st. That the *Tetrao urophasianellus* of Douglas is but a synonym of the true Sharp-tailed Grouse (*Pediocætes phasianellus* of Baird); 2d. That the

specimens sent by Mr. Kennicott from Fort Rae and Big Island, have hitherto been unnamed, although birds from the same locality were examined by Sir John Richardson, and the plumage described by him, under the belief that they belonged to the true *phasianellus*.

We have named the present species in honor of Robert Kennicott, who in the course of his arduous explorations of the interior of Arctic America, has obtained and forwarded to the Smithsonian Institution three fine specimens.

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Notes on Cretaceous Fossils with descriptions of a few additional new species.

BY W. M. GABB.

Since my last paper on Cretaceous Fossils has gone to press, I have had an opportunity of examining the collection of the Burlington County Lyceum of Natural History, at Mt. Holly, N. J. Besides most of the common species, I found several very rare ones, and two or three which were entirely new to me. I shall embrace the present opportunity for mentioning some new facts in regard to certain species and for clearing up some doubtful points in the affinities of others.

It may be worth mentioning, that besides the species described by myself and others, from time to time, in the publications of this Society, over one-third of all the New Jersey Cretaceous fossils in my collection are, as yet, nondescript; and many of the specimens unique. This is true, in a smaller proportion, of the same portion of the Academy's collection. I think I have undoubted proof of the existence of upwards of two hundred unnamed and uncharacterized species of Cretaceous fossils, found in Alabama and New Jersey. The reason of this is, that they are usually found in the shape of casts, and in most cases are not sufficiently characteristic to determine the genera.

TURRITELLA Lam.

*T. granulicosta*, n. s.—Shell elongated, whorls many, increasing very gradually in size, almost perfectly flat on the sides. Suture impressed, very distinct; bordered below by a slight elevation of the upper edge of the succeeding whorl; lower angle of the whorl, rounded, subangular. Mouth small, subquadrate, anterior angles rounded. Surface marked by about twelve fine, thread-like revolving ribs, three of which are larger than the rest, are placed at equal distances from each other, and from the upper and lower edges and are slightly undulated so as to produce a series of minute nodes. This character shows itself to a much less extent on some of the smaller ribs. Under surface of the body volution marked by a few fine revolving ribs, with regular concavities between them.

Length of last four volutions, .7 in. Width of body whorl, .3 in. Length of aperture, .2 in.

*Locality.* Burlington Co., N. J.

I have long been acquainted with casts of this species, differing only from those of *T. vertebroides*, Mort. in size. This specimen, belonging to the Mount Holly Society, is the first one I have ever seen that has shown any characters on which to separate it. It has the shell perfectly preserved on a large portion of its surface, and is one of the best characterized species in the formation. There is another species found with it, of which I have only seen casts. They are of about the same size and marked by a few large longitudinal ribs.

NATICA Adanson.

*N. acutispira* *Shum.*—Through the kindness of my friend Dr. Moore, State Geologist of Texas, I have had the opportunity of examining a specimen of this species. It is undoubtedly authentic, and may be the type. It is, however, 1861.]

ever, without question, the same as *N. rectilabrum* Con., the types of which are in the Academy's collection. The latter species has long been considered by me, and I believe by Mr. Meek, as being identical with *N. (Lunatia) concinna* H. & M. The only difference that I could observe between the types of Mr. Conrad's species and Dr. Shumard's was, that the spire of the latter was about .05 in. higher. This, of course, will not entitle it to a distinct specific rank.

#### VOLUTILITHES Swains.

*V. Conradi* Gabb.—This species, like many others of the New Jersey fossils, was described originally from casts. It is by no means rare. I have on two occasions seen portions of the shell. One in the collection of the Mount Holly Society is very thick, marked by, (I think about fifteen) moderately sized longitudinal ribs, crossed by numerous fine revolving impressed lines, placed about an eighth of an inch apart. It belongs with *V. bella*, *V. Texana*, and *V. nasula*, to the genus *Fulguraria*.

#### CLAVAGELLA Lam.

*C. armata* Morton is such a rare species, that I had almost believed that Dr. Morton had made some mistake in describing it. The type is lost and I had never seen the species, until I fortunately encountered it at Mt. Holly.

The shell is larger and more robust than represented by Dr. Morton, but there can be no doubt of the identity of the species. It is a true *Clavagella*. One valve is evidently attached to the tube, while the other is free. I now possess one of the only two specimens of which I know.

#### VENILIA Morton.

*V. quadrata*, n. s.—Shell subquadrate, gibbous; beaks anterior, nearly terminal, cardinal line almost straight, slightly sloping downwards towards the posterior edge, which is obliquely truncated. Anterior end rounded and merging into the basal edge, which is broadly curved. A prominent subangular ridge passes from the beaks to the posterior basal angle, remaining very distinct to its termination. Posterior muscular scar round, anterior scar subcrenate. Surface unknown, (a cast.)

Length, 1.5 inch. Width, 1.7 inch. Depth of valve, .75 inch.

A cast from the "Upper member of the Ripley Group," from Mississippi. Coll. Acad. From Dr. Spillmann.

About the size of *V. Conradi*, this species can be distinguished by its regular quadrate outline. This will also separate it from *V. trigona*. It has more nearly the shape of *V. trapezoidea* or *V. rhomboidea*, but is very much larger than either, and is somewhat more rounded in outline.

#### CRASSATELLA Lam.

*C. transversa*, n. s.—Shell wide. Beaks (in cast) acuminate, prominent and placed in little less than one-third of the width of the shell, from the anterior end, which is broadly rounded, being slightly more prominent abreast of the muscular scars than elsewhere. Posterior extremity obliquely truncated, subangulated below, and sloping with a curve to near the upper part of the posterior muscular impressions, where it blends with the cardinal margin which is straight, but most depressed behind. Basal edge sinuous, somewhat emarginate just below the posterior muscular scars, as in *C. Monmouthensis* nob. Pallial border marked by a strong rounded ridge. Edge crenulated internally.

Length, 1.3 in. Width, 1.9 in. Diameter, .75 in. (cast.)

This species, described from a cast in the collection of the Burlington County Lyceum of Natural History, is as large as the average specimens of *C. vadosa* Morton, but is much shorter in proportion to the width, being produced posteriorly as much as *C. pteropsis* Con., but in a different manner. This latter

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character will separate it from *C. Monmouthensis*. The upper portion of the posterior end, which, in the latter species, is distinctly angular, is broadly rounded off in the present one. The beaks are also much more distant, narrower and more acute, the two sides sloping up at about the same angle. The muscular scars are of about the same shape, the posterior ones longest, while in *C. Monmouthensis* they are smallest. The anterior end is more prominent than the corresponding portion of *C. Delawarensis* nob., the posterior end more produced, the truncation being of a similar character, but more oblique, and the basal emargination very distinct, while in the latter form it is often entirely absent. This species seems to be very rare, since this specimen is the only one I have ever seen.

#### ΑΧΙΝÆΑ Poli.

*A. subaustralis* Gabb. (*Pectunculus Australis* Morton).—Dr. Morton says in his synopsis, "I possess casts of another species from the marls of New Jersey."

These casts I have always considered as belonging to the above species, but had no proof except that they corresponded in size and form to his type. I have now before me undoubted proof of the correctness of my opinion in the shape of three specimens, two of single valves, the other with both valves in contact. I am indebted to the kindness of Dr. G. Brown, the courteous curator of the collection of the Mt. Holly Society, for these specimens.

#### PECTEN Gault., Linn.

*P. Texanus* Gabb, (*Virgatus* Roem. not Nills.) This form is undoubtedly distinct from the *P. virgatus* of Nillson and Goldfuss. It is a broader and shorter shell, and with the ribs, over the surface, more than twice as numerous. I have frequently observed casts in the New Jersey marls, and there is a piece of shell from Alabama in the collection of the Academy which I cannot separate from this species, as described and figured by Dr. Roemer. It may be that they differ by the sides, from the beaks to the widest portion of the shell, being longer and straighter. They show the same equivalve, compressed form, and are twice as large as Dr. Roemer's figure. The ears I have never seen.

*P. Nilssonii* Roem. does not correspond, certainly, with Dr. Goldfuss' species; the markings are the same, but the form is somewhat different and the ears are very distinct. The right ear of the right valve is very slightly emarginate, (see figure.) He says, "Das rechte Ohr der rechten Klappe für den *Byssus* deutlich ausgeschnitten," while in Goldfuss' figure pl. 99, fig. 8, *b*, it is very deeply emarginate, the extremity being widened and the hinge line concave.

It may be *P. Barlingtonensis* nob., Jour. Acad. 2 Ser. Vol. 4, pl. 48, fig. 25, in which the artist has represented a few slight undulations in such a way as to convey an erroneous impression that they are almost concentric ribs. The surface is plain or very obscurely undulated, and it is marked by fine concentric, very slightly prominent imbrications.

#### NEITHEA Drouet.

##### *Pecten, Janira*, pars Auct.

*N. Mortoni*, nob., *Janira* id. d'Orb., *Pecten quinquecostata* Mort. not Sow. Dr. Morton says, "This fossil is beyond a doubt specifically identical with the one described by Sowerby, and so characteristic of the cretaceous strata of Europe;" but as d'Orbigny justly observes, all the species of this group have been confounded under one specific name.

With the latter author, I believe it to be undoubtedly different from that species. It is a very common fossil in some of the beds of the Jersey, and I have observed it from Alabama and Tennessee. I have a very fine specimen 1861.]

from the last mentioned State, kindly sent to me by Prof. Safford, the State Geologist. The specific characters are as follows:

Shell equilateral, or nearly so, very inequivalve. Lower valve deep, convex, sometimes a little the longest at the lower left hand corner, when the valve is laid on its face. Surface marked by six large radiating ribs, placed at about equal distances, and with usually four, sometimes but three intermediate ribs. When there are four, two or three of them are of about the same size, the other one or two being much smaller and placed on the side of the adjoining principal rib. Between the most external principal rib, on each side and the ear, there are from four to six fine linear ribs. The whole surface is crossed by minute imbricating lines of growth. Upper valve flat or concave, and marked by about from twenty-six to thirty nearly uniform, radiating ribs, with wider concave interspaces. The tops of the ribs are subtriangular or regularly rounded. There is, very rarely, the slightest approach to the sexradiate arrangement of the other valve. I have not seen the ears, but Dr. Morton figures them as being small and equal. He has them of nearly the right size, but I think the left hand one, from the remains on my specimen, should be larger.

Dr. Morton's figure is in the main correct. The basal margin should, however, be more excavated between the large ribs, and the intermediate ribs are too numerous. The inequality of the two sides is well represented.

This species can be distinguished from both *N. quadricostata* and *N. quinquecostata* by the upper valve. Instead of having six large ribs with three or four smaller alternate ones, all of the ribs are of a nearly uniform size. The valves are less undulate on their margins than either of the above species.

Roemer calls this species a variety of "*Pecten quadricostatus*."

#### CTENOIDES Klein.

*C. squarrosa* n. s.—Shell oblique, gibbous. Surface marked by about ten or twelve larger uniform square ribs placed at about equal distances, nearly flat on top, and with semicircular concavities between them, a little wider than the ribs. The top of each rib is marked by two grooves, so as to make it tricostrate. At the base of each interspace is a fine linear rib. The whole surface is crossed by distinct lines of growth, somewhat imbricated. Ears unknown. Height .6 in., greatest width .5 in., height of valve .18 in.

The form of this species is about exactly like that of *C. pelagicum*, but it can be distinguished by the much smaller number and relatively larger size of the ribs.

*Locality and position.* White cretaceous limestone of Alabama.

One specimen. Coll. Academy.

#### TEREDO.

*T. tibialis* Morton. Syn. p. 68, pl. 9, fig. 2. Dr. Morton includes two very different fossils under this name. We will have to retain his name for the species figured. The one to which he refers as occurring in the "friable marls" is *T. irregularis* nob. *T. tibialis*, however, is not a *Teredo*, but is probably allied to *Vermetus*. It has never been found boring, but grows in aggregated masses of cylindrical tubes, almost always parallel and straight, sometimes five inches long, slightly variable in diameter from irregular constrictions, contains no shell, but the tube is divided at certain distances by transverse septæ, convex and thin, the convexity pointing towards the widest (or newest) portion of the tube, as if the animal progressed along the tubes, closing the space behind it, as in the manner of the *Cephalapoda*, but hermetically. I can find no genus described, in which I can place this species, from the fact that the shell is straight from the beginning. I therefore propose the generic name ΠΟΛΩΡΗΤΗΣ, and characterize it as follows:

Shell tubular, straight or nearly so, growing in aggregated masses arising

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from a common base. Interior of the tube closed at certain points by a transverse septum. Animal unknown.

I place this genus near *Vermetus*, from the statement made by Pictet, that "Les tubes des serpules sont complètement libres, tandis que les coquilles des vermetes sont coupées par de petites cloisons intérieures transverses, que forme l'animal à mesure qu'il s'accroît."

H. and A. Adams, in their "Genera of Recent Mollusca, however, do not mention these partitions.

*P. Americana Gastrochana* id., nob. Jour. Acad. 2 ser., vol. 4, p. 393, pl. 68, fig. 20.

Since describing this species, I have obtained specimens, retaining large portions of the shell, and which prove that this is a second species of the same genus. The figure quoted above, taken from a cast, illustrates the form. The shell is thin and smooth. The septæ are as thick as the outer wall, placed at distances varying from half an inch to two inches or more. The convexity, as in the above form points towards the larger end. This species is much larger than the preceding. I have seen one tube having a diameter of .7 inch at its broadest extremity.

Not rare in the Ripley Group of Alabama and Mississippi, and found, as casts, in the yellow limestone of Timber Creek, N. J.

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#### Descriptions of New Species of American Tertiary Fossils and a New Carboniferous Cephalopod from Texas.

BY W. M. GABB.

*PHOS* Montf.

*P. bellaliratus*.—Shell robust; spire elevated, whorls eight. First three smooth and polished, subsequent ones marked by numerous longitudinal angulated ribs, of which there are about twenty on the body volution. Between them, the interspaces are regularly concave. These are crossed by revolving lines, about fifteen to eighteen on the body whorl, nine or ten of which are visible on the preceding ones. Suture small but distinct, and bordered by a prominent, undulated rib; the whole surface of the shell being crossed by well marked lines of growth. Mouth short, rather wide. Outer lip acute on the edge, thickened behind and internally striate. Inner lip covered with a thick coat of enamel, smooth and polished. Canal short, deeply notched and with a large fold on the truncated edge of the columella.

Length, .6 in.; width of body whorl, .3 in.; length of mouth, .24 in.

From the Eocene of Claiborne, Ala. Coll. Acad.

From *P. Texanus*, nob., the nearest allied form, this species can be distinguished by the more robust shape, lower spire, absence of the occasional tendency to form pseudo-varices, or periodical arrests in growth; the broader mouth and the perfectly smooth columellar lip, which, in the latter species, is marked by a few irregular polished thickenings or teeth. The notch, at the end of the canal is deeper and more oblique, the longitudinal ribs are more prominent, acute, fewer in number and placed further apart. *P. Texanus* has distinct revolving ribs; in the present species these are mere imbrications, abrupt above and sloping anteriorly to the edge of the succeeding ones, except near the canal, where the last two or three take the form of ribs.

*VOLUTA* Lam.

*V. sinuosa*.—A fragment, in the collection of the Academy, from the Miocene, either from Virginia or North Carolina, displays such strong specific characters, that, notwithstanding its mutilated condition, I shall venture to 1861.]

name it. The fragment consists of the principal part of the body whorl, including the anterior two-thirds of the mouth and, on the opposite side, the surface, almost to the suture. It resembles somewhat *V. mutabilis* Con., but the body whorl is more convex in the middle, although the shell was more slender in its outline. Shell thick, mouth narrow, curved and more regular in its width than *V. mutabilis*. Columellar lip with three very prominent rounded folds, the anterior one most oblique and ending gradually at its outer extremity. The upper two end abruptly, the upper one most decidedly so. These folds are as high as the thickness of the shell, while in *mutabilis* they are always faint, sometimes almost obsolete. Columella very tortuous, reflected somewhat upwards at its extremity, when the shell is in its natural position. Surface smooth.

Length of body whorl about 2.5 inches; width about 1.25 inches.

#### TURBONILLA.

*T. aspera*.—Shell elongated, acute; spire very high, whorls ten or eleven; suture distinct. Mouth ovoid, slightly expanded at the inner anterior margin, angulated behind; columella nearly straight. Surface of the whorls most prominent a little below the middle, and marked by about ten very prominent longitudinal ribs not continuous from one whorl to another. These ribs are crossed by three revolving lines, which take the form of acute ribs between the longitudinal ones, but develop into large nodes on their crest; under surface of the body whorl marked by four additional plain revolving ribs, becoming smaller in advance.

Length .28 in.; width of body whorl .08 in.; length of mouth .06 in.

From the Miocene of Santa Barbara, Cal.

#### MODELIA Gray.

*M. striata*.—Shell turbinate; whorls five, rounded above. Suture simple, well marked. Mouth about half the length of the shell, angulated above, broadly rounded below, and somewhat expanded anteriorly. Outer lip simple; inner lip simple above, marked by a thickened line inside the margin, in advance of the umbilicus and extending to the middle of the anterior margin. Umbilicus small, deeply perforated and bordered by a sharp line. Surface marked by minute revolving striæ, very numerous, most distinct on the under surface of the body whorl; and a few larger lines of growth. Outline of the whorls regularly but slightly convex above, concavely truncated below, and with the lower angle marked by a sharp angular revolving ridge immediately below the line where the succeeding whorl comes in contact with the surface, so that it is only visible on the body whorl.

Length .2 in.; width of body whorl .14 in.; length of mouth .1 in.

From Santa Barbara, Cal. Miocene?

The carina on the lower angle of the whorl appears, on a cursory examination, to be the broken remains of the mouth, on account of its proximity to the posterior end of the outer lip; but is, in reality, a normal character, is a very little below the edge of the lip, and is found at all ages of the shell, becoming in adult shells somewhat less marked as it approaches the extremity, on the body whorl. In advance of it, the lip is very faintly emarginate.

#### ROCELLARIA Fleuryau de Bellevue.

*R. antiqua*.—Shell cuneiform, very widely gaping in front. Beaks small involuted; anterior but not terminal. Cardinal margin straight for about half the width of the shell, joining the posterior margin, which continues a short distance, nearly parallel with the basal edge. The posterior extremity is broadly and regularly rounded. Basal margin nearly straight, the hiatus between the valves continuing from the extreme anterior end almost to the pos-

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terior end, being broadly rounded in advance and gradually tapering behind. Surface marked by irregular lines of growth, placed very closely, sometimes most distinct on the basal half of the shell.

Length from the anterior to posterior end, .3 in.; greatest width, at right angles to first measurement, .18 in.; depth of one valve, .09 in. These measurements are from a small single valve. I have before me another specimen imbedded in a piece of shell of one of the large Mercenarians of the Miocene, probably of James River, Va., which is more than twice as large. From marks on this fragment, it appears to be gregarious. Compared with *R. dubia* (recent) as figured by H. and A. Adams, this shell is broader posteriorly, more curved on the cardinal side, and the open space between the two valves, in front, commences more abruptly and is continued further posteriorly. The beaks are more nearly terminal, the anterior portion of the shell being less produced.

#### SPHENIA Turton.

*S. bilirata*.—Shell elongated subquadrate, convex. Beaks nearly terminal, small, incurved. Umbones small, depressed or undulated by a faint median depression which usually extends about half the length of the shell, becoming obsolete. Anterior extremity most prominent near the basal margin. Posterior end abruptly truncated. Cardinal and basal margins nearly parallel, narrowest posteriorly. The basal margin is straight or very slightly emarginate. From the beak extend two distinct ridges, both very much imbricated in the young shell, less so in the more advanced state. The most anterior of these runs directly to the posterior basal angles, the other is intermediate between it and the cardinal edge, both ending rather abruptly when the shell is about half of its full size. Surface closely and irregularly marked by heavy folds.

Length, .2 in.; width, .35 in.; greatest diameter (variable) .15 in.

Santa Barbara, Cal.

#### TELLINA Linn.

*T. euryterma*.—Shell wide, nearly equilateral. Beaks small, acute. Extremities broadly and nearly evenly rounded. Hinge line slightly excavated in advance of the beaks, straight and sloping behind. Surface smooth or marked by faint lines of growth. Hinge small.

Length, .5 in.; width, .95 in.; height of single valve, .1 in.

Allied to *T. sericea* Con., but can be distinguished by the anterior end, which in that species is narrow and even subacute, being in this as broad as the posterior end. The beaks are more nearly central than in that species. Having nearly the same general form as *Psammobia lintea* Con., the beaks are more elevated, the ends more even and the surface smooth, while it is marked by elevated lines in the latter species.

From the Eocene of Vicksburg, Miss.

#### VENUS Linn.

*V. rhysonia*.—Shell small, rounded—subtriangular. Beaks small, incurved, and placed about a third of the width, from the anterior end. Posterior cardinal margin nearly straight; posterior extremity narrow, rounded. Surface highly polished, marked by obsolete lines of growth, and radiating lines so indistinct as only to be visible through a lens by the aid of reflected light. Hinge short, teeth compressed. Pallial sinus deep and broadly rounded at its base. Internal margin smooth.

Length, .2 in.; width, .25 in.; depth of valve, .06 in.

From Santa Barbara, Cal. Miocene (?)

I have seen three valves of this species, the measurements above being from the largest. I never saw fossils presenting more the appearance of recent shells than these specimens. Except for a slight change in color, they could not be 1861.]

distinguished from specimens taken fresh from the water. They appear to have lost little, if any, of the animal matter, and preserve a perfect polish.

The present species may be compared in form with *Meretrix* (*Cytherea*) *Marylandica* Con., Miocene Foss. pl. 9, fig. 1. It differs in being more regularly rounded anteriorly, beaks smaller in proportion, (the umbones being almost acute,) and in being proportionately wider.

#### MERETRIX.

? *M. Yoakumii*.—Shell subquadrate; beaks prominent, placed one-third of the distance from the anterior extremity, which is regularly rounded. Posterior cardinal margin straight. Anal extremity subtruncated. Surface marked by numerous very regular concentric ribs, which are abrupt on the side towards the beak, and slope concavely on the other side. Crests of the ribs rounded or subangular. Interspaces a little wider than the ribs.

Length, .3 in.; width, .4 in.; height of valve, .09 in.

From a brown, highly ferruginous sandstone, (Eocene), Caddo Peak, Texas. Collected by Prof. Yoakum.

The specimen being so imbedded that I could not obtain a view of the hinge, renders the determination of the genus somewhat doubtful; but since it presents the usual appearance of this genus more strongly than of any other, I refer the species provisionally as above. The shallow valve, the abrupt posterior end, and the very distinct ribs (about thirty in number on the specimen before me), will serve to separate the species from all the other known species.

#### PROTocardia Beyrich.

There is a group, in the genus *Cardium*, which can always be distinguished by the peculiar surface markings. This group was separated, in 1845, by Beyrich, under the above name, taking *Cardium Hillanum* Sow., as the type of the new genus. I see no reason why it should not be considered a valid genus, since it can always be distinguished by very obvious characters, and appears to be fully as well founded as many ordinarily received genera. It ranges from the Lias to the Eocene. I am not aware of any species described outside of these limits. The markings are as follows, the anterior two-thirds to four-fifths of the surface is plain or concentrically striate, while the remainder is radiately ribbed. The following species belong to this genus:

LIAS.—*C. truncatum* Phil.

OLITE.—*C. senipunctatum* Munst.; *C. semiglabrum* M.; *C. intextum* Munst.

CRETACEOUS.—*C. Hillanum* Sow.; ?*C. pustulosum* Munst.; *C. abruptum* Gabb; *C. multistriatum* Shum.; *C. Brazonsis* Shum.; *C. Spillmanni* Con.; *C. Coloradense* Shum.; *C. peregrinorum* d'Orb.; *C. subhillanum* Leym.; *C. impressum* Desh.; *C. Guerangerii* d'Orb.

Eocene.—*C. Nicolletii* Con.; *C. diversum* Con.

? *P. diversa* Con. sp.—A small specimen from Houston Co., Texas, from an Eocene deposit presenting most of the characters of this species, but differs in some few points. It has the form of the typical specimens of *P. diversa* except that the buccal extremity is more regular, the basal margin is entire, and not sinuous as in adult specimens of that species; this may be however merely the effect of the difference in age. The anterior portion is marked by obsolete cancellations, and the posterior radiations are somewhat different. The ribs are broad and rounded, with small bars placed at short intervals connecting them, while in the young state of *P. diversa* the ribs are linear with wide spaces and without connecting bars. In that species, also, the radiated portion of the surface blends into the adjoining surface by the ribs becoming obsolete, while in this specimen the same portion ends abruptly, the ribs all being of the same size. It will be necessary to examine more specimens to decide whether this is

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the young of a variety of the above species, or distinct. Should it prove so, I suggest the name *P. gambrina*.

#### CARDITA Brug.

*C. monilicosta*.—Shell nearly circular; beaks small, submedian, cardinal border straight or faintly arcuate. Surface marked by from fourteen to seventeen large rounded ribs, strongly moniliform; interspaces narrow, acute. Posterior muscular impressions largest. Pallial line broad and distinct but not impressed. Internal margin coarsely crenulate, one large square tooth, corresponding with each interspace between the ribs; extreme edge undulated. Hinge robust.

Length, .19 in.; width, .2 in.; depth of single valve, .05 in.

From the Tertiary (probably Miocene) of Santa Barbara, Cal.

This beautiful little shell is somewhat variable in the size and prominence of the nodulations of the ribs, the number of the ribs themselves, and the depth of the valves. One specimen before me, with about the depth given above, is larger and wider, so that the proportions are a little different. It can, however, be readily distinguished by its small size, subcircular form, and the approximate number and beading of the ribs.

#### PERNA Adanson.

##### *Modiola* Lam.

*P. Texana*.—Elongated subtriangular. Beaks terminal, small; umbones prominent, though small; anterior end rounded, narrow; cardinal margin straight, basal broadly sinuous; posterior basal angle abruptly rounded; posterior edge broadly convex, uniting, with a regular curve, with the cardinal line. Umbonal ridge high, convex; anterior slope abrupt and slightly convex near the margin towards the beak, between which convexity and the ridge is a slight concavity; posterior slope regular. Surface covered by numerous, radiating, dichotomous ridges, flattened above, separated by deep depressions and crossed by fine lines of growth. These ribs almost disappear on the anterior umbonal slope for about the marginal half of its width.

Length from beak to posterior angle, 2 inches. Width, at a right angle to the first measurement, .9 in. Depth of valve, .4 in.

From a coarse brown, highly fossiliferous Eocene sandstone from Caddo Peak, Texas. My collection, from Dr. Moore, State Geologist of Texas.

Differs from *P. Mississippiensis* (*Modiola id.* Con.) in having the cardinal line longer and the shell less oblique. The ribs, which in the latter species entirely disappear in advance of the umbonal ridge, become much smaller in the same part of the present species, but are persistent throughout. All of the ribs are larger and wider apart than in Conrad's species.

#### MORRISIA Davidson.

*M. Hornii*.—Shell small, lenticular, flattened. Surface minutely granular, and sometimes with a few indistinct lines of growth, often entirely absent. Outline varying from almost perfectly circular in young shells to indistinctly rounded subquadrate, (exclusive of the beak,) the greatest width being towards the basal margin, which is compressed. Lower valve, beak acute, area narrow and not so long as the width of the shell. Upper valve sometimes marked by a faint, linear, longitudinal depression, running from the foramen, about half the length of the shell. Foramen large, encroaching on both valves, in the usual manner in this genus, but most strongly on the upper valve; pentagonal in shape, the upper angle (in the lower valve) acute, lower portion more elongated and with the two lower angles often rounded.

Length, .11 in.; greatest width, .11 in.; diameter, .015 inch.

From the Miocene (?) of Santa Barbara, Cal.

1861.]

This beautiful little species, which was first pointed out to me by my friend, Dr. Horn, occurs in a rich fossiliferous marl, associated with numerous species of Polyzoa, and some larger mollusca, and is not uncommon. The measurements given above are from the largest specimen. It appears to be full grown. It differs from *M. anomioides* Scacchi, as figured by H. and A. Adams, in being more rounded in outline, never nearly so quadrate, and in wanting entirely the basal emargination, although, in some specimens the lower margin is faintly undulated, showing a tendency to form a median sinus.

## CARBONIFEROUS.

### GONIATITES.

*G. entogonus*.—Robust, discoidal; whorls six or seven, gradually increasing in size, each one embracing about two-thirds of the preceding volution. Umbilicus broad, making about a third of the diameter of the shell. Body whorl broadly rounded on the dorsum, widest at the umbilical margin, which is bordered by a sharp angular ridge, inside of which the surface slopes to the preceding whorl with a very slight convexity. The cast is marked by about five depressions on each whorl, the remains of periodical, thickened lips, which are nearly straight in the younger state, but are slightly sinuous in the larger specimens. Septæ placed closely, so that the extremities of the saddles are within the line of the ends of the lobes of the preceding septum. There are two lobes and two saddles on each side besides the dorsal lobe. Dorsal lobe long, sides nearly parallel, extremity doubtful (probably bifid); dorsal saddle wider than the lobes; sublinguæform and acuminate in the middle; superior lateral lobe of about the same size as the dorsal saddle, but somewhat wider at its commencement and rounded at the extremity; lateral saddle differs only from the dorsal in being wider; latero-ventral lobe very oblique, with its internal edge extending to the carinated margin of the umbilicus.

Diameter, 2.25 inches; height of mouth, .5; width of mouth, 1.2 in.; height of body whorl, .9 in.

From the carboniferous limestone of Lampases Co., Texas, immediately underlying cretaceous rocks. State collection, Austin, Texas.

This species is most nearly related to *G. Owenii* Hall, and *G. Hyas* ej. It differs from the former in having a broader umbilicus than is shown in the figure of that species (13th Report, Regents N. Y. Univer., p. 100,) and in the additional lobe to the septum. The whorls are broader and more embracing than those of *G. Hyas*; the septum has the same number of lobes, but they are of a different shape, the extremities being rounded, while the extremities of the saddles are pointed, being just the reverse of the arrangement in that species. The latero-ventral lobe of the present species is very oblique, especially on the ventral side, and the corresponding saddle is almost absent, while in *G. Hyas* this lobe differs only from the lateral one in size and the ventral saddle is distinctly marked. The carinated edge to the umbilical margin of the body whorl will also serve as a strong distinguishing character.

Associated with this species is the mutilated cast of a large species of *Belleophon*, which I cannot identify with any known species. I am indebted to my friend, Dr. Moore, State Geologist of Texas, for the privilege of studying this and many other interesting fossils collected in that State.

## Notes on certain Decapod Crustacea.

BY WM. STIMPSON.

### PACHYGRAPSUS MARMORATUS.

*Cancer marmoratus* Fabr.; Herbst.

*Grapsus varius* Latr.; M. Edw.

*Leptograpsus marmoratus* M. Edw. Melanges Carcinologiques, p. 137.

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It is evidently congeneric with *P. crassipes*, the type of *Pachygrapsus*. We have specimens from Constantinople in the Smithsonian Museum.

## CYTROGRAPSUS ANGULATUS.

*Cyrtograpsus angulatus* Dana, U. S. Exploring Expedition, Crust. i. 352, pl. xii. f. 6.

In our specimens the ambulatory feet are ciliated toward their extremities. "Rio de la Plata," Capt. Page's Expedition.

## METASESARMA TRAPEZIUM.

*Sesarma trapezium* Dana, loc. cit., i. 354, pl. xxii. f. 8.

An examination of Prof. Dana's original specimens shows that this species belongs to M. Edwards' genus *Metasesarma*.

## GEOHELPHUSA BERARDI.

*Thelphusa berardi* Savigny, "Egypte" Crust. pl. ii. f. 6. M. Edw., Hist. Nat. des Crust. ii. 14; Mel. Carcin. p. 178.

We have specimens from Egypt, brought home by Mr. Marsh.

## POTAMOCARCINUS DENTICULATUS, n. sp.

The following description will serve to distinguish it from *P. armatus*, the only species hitherto known.

Carapax flattened, obsolete granulated. Antero-lateral margin denticulated; little teeth about eighteen in number on each side. Meros or fourth joint of the external maxillipeds broad, almost quadrate. Length of carapax in a male, 0.84; breadth 1.22 inch.

In the river Atrato, New Granada. Atrato Exploring Expedition.

## DILOCARCINUS PICTA.

*Dilocarcinus pictus* M. Edw., Arch. du Mus. vii. 181, pl. iv. f. 2.

Paraguay, Capt. Page's Expedition.

Dr. Randall's genus *Orthostomas* was founded on a species of M. Edwards' subsequently constituted *Dilocarcinu*. This name has, however, been used twice previously in Articulata.

## DILOCARCINUS PAGEI, n. sp.

A species closely allied to *Dilocarcinus spinifer* M. Edw. It differs, however, in the following particulars: The surface of the carapax is more even, the limits of the regions being scarcely traceable. The seven teeth of the antero-lateral margin are arranged as in *Dilocarcinus castelnaui* M. Edw., the second tooth not being distant from the angle of the orbit. The inferior margin of the orbit is armed with six very sharp, slender spines. The inferior margin of the meros-joint in the chelipeds is four-spined; while the joint preceding it is one-spined. From *D. castelnaui*, which it resembles in the shape of the carapax, etc., it differs in having five sharp spines at the antero-lateral angle of the buccal area.

Paraguay, Capt. Page.

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**A Monograph of the Genus ÆGIOTHUS, with descriptions of new species.**

BY ELLIOTT COUES.

Since the publication, in 1858, of the Ninth Volume of the Reports on the Pacific Rail Road Surveys—the General Report on the Birds—the amount of material has steadily and rapidly increased, until there is, at the present day, more than double the number of specimens in the museum of the Smithsonian. 1861.]

This great accession of new material in all departments of Ornithology, has of course, proportionally increased our knowledge of the birds of North America, both as regards the number of species inhabiting the continent, and their geographical distribution; and has furnished the means of making many additions and some corrections, to the General Report. But, perhaps, to no single group of birds have there been so many added, as to that one to which it is proposed to devote a few pages.

At the time of the writing of the article on *Ægiothus*, in the General Report, there were but eight specimens of the genus in the collection, and those representing but a single species. The series of *Ægiothi*, from an examination of which the present paper was prepared, consists of more than one hundred specimens, from very various localities in America, Europe and Greenland, and comprises all the known species, except *A. rufescens* and *Holbölli*, and is, moreover, particularly rich in the species described here for the first time. The very large series of *Ægiothus exilipes* were mostly procured by Messrs. Robert Kennicott and Bernard R. Ross, though some were received from Donald Gunn, Esq. The series of *A. fuscescens* were mostly obtained by ourselves in Labrador. The specimens upon which the *A. rostratus* is founded were kindly furnished for examination by the Copenhagen Museum, which also supplied the examples of *A. canescens*, and of the European type of *A. linarius*.

The above remarks seem necessary to prevent the doubt that might otherwise very naturally arise, that at this late date there could remain undescribed three species of so well known a genus as the present. We may be allowed to add, that we have formed our opinions only after long study and deliberation, as well as consultation with several very eminent ornithologists.

Though the four described species of *Ægiothus* are well known, the synonymy of some of them is in a state of considerable confusion. For this reason, and for the sake of showing more clearly the relationships of the new species, it has been deemed advisable to present a complete monograph of the genus.

#### ÆGIOTHUS Cabanis.

*Fringilla* sp. Linnæus, 1766, et auct. antiq.

*Passer* sp. Pallas, 1811, nec auct.

*Spinus* p. Koch, nec Boie, 1826.

*Linota* p. Bonaparte, 1838.

*Linaria*, Cuvier, 1817, nec Bechst., 1802, cujus typus *Fring. cannabina* Linn.; nec *Linaria* Tourn. quæ plant. gen.

*Acanthis*, Bonaparte, 1850; nec Bechst. 1802, cujus typus *Fring. carduelis* Linn.; nec Meyer, 1822, (typus idem): nec Keys. et Blas. 1840, cujus typus *Fring. spinus* Linn.

*Ægiothus*, Cabanis, Mus. Hein. 1851, 161. Typus *Fring. linarius* Linn., Baird. Gen. Rep. 1858, 428.

*Linacanthis*, Des Murs. 1853, fide G. R. Gray.

*Char. gen.*—Rostrum parvum, breve, rectum, plus minus compressum et acutum, basi plumulis rigidis, recumbentibus, nares rotundas occultantibus tectum. Alæ longissimæ, remigibus primis tribus fere inter se æqualibus. Cauda elongata, valde forficata, reatricibus latis, rotundatis. Pedes breves, debiles, digito medio sine ungue tarso multo brevior, digitis lateralibus fere inter se æqualibus, halluce ungue brevior. Ungues elongati, compressi, incurvati, acutissimi.

Mas et fem. omni temp. pileo rubro induti; mas nupt. temp. pectore uropygioque roseo vel carmesino tinctis.

The genus which occupies our attention at present is one of the most distinct and easily recognizable of the *Fringillidæ*. Its essential characters lie in the small, more or less compressed and acute bill, covered at the base with recurved plumuli, so long and dense as to completely hide the nostrils; in the long wings; in the rather long deeply forked tail; and in the weak feet with their very short toes. The pattern of coloration also seems, in this instance, to be a generic character, being precisely the same in all the known species of

the genus, and not existing in any other, though there is seen an approach to it in *Cannabina*.

In the type of the genus the bill is exceedingly acute and much compressed, the lateral outlines even concave. From this character of bill, there is seen through *A. Holbölli* and *fuscescens*, a gradual transition to the *A. rostratus*, where the bill is much larger, less compressed and acute, and more full and turgid. The plumuli are also considerably shorter and more scant: and the whole appearance of the bill much that of a *Cannabina* or even of a *Carpodacus*. The wings are very constant throughout the genus, differing scarcely appreciably in length or pointedness in the different species, though the proportions of the primaries vary considerably in the same species. Exactly the reverse, however, is the case with regard to the feet; i. e. the characters differ considerably in the different species, but always are quite constant in each. Thus in *linarius*, *rufescens*, *Holbölli*, *fuscescens* and *rostratus* the proportions of tarsus and toes are much the same, the difference in absolute length being only proportional to the size of the birds. In *exilipes* the feet are smaller and weaker, and the toes shorter, the difference being specially noticeable in the middle toe, which, with the claw, is shorter than the tarsus. In *canescens*, on the other hand, the feet are larger and stronger, even more so than is proportional to the greater size of the bird; but the toes are excessively short, so much so that even the unusually long claw does not make the middle toe equal to the tarsus. The tail differs but slightly, if at all, in the different species; for though *A. canescens* is spoken of by authors as having a comparatively longer tail than has *linarius*, the difference seems hardly more than is proportional to the greater size of the bird.

With respect to color, the species present a remarkable similarity, not only in the pattern of coloration, but also in the tints. In all, there is found the crimson pileum, which varies in size, and in the intensity of the color, with sex and age. It has sometimes a peculiar coppery or brazen reflection, very different from the usual deep crimson tint. The breast, with the sides of the head and body to some distance, as well as the rump, are tinged with rosy or carmine. In the examination of a great number of specimens I have noticed a fact that I have seen nowhere stated. It is that the depth and intensity of the color on the breast and rump is in direct proportion to the lightness or darkness of the general colors of the bird. Thus, in *rostratus* and *fuscescens*, the rosy on the breast becomes so bright as nearly to equal in intensity the crimson of the crown. *Canescens* and *exilipes* present the other extreme, the rosy of the breast being very light, scarcely more intense than that on the rump. *Linarius*, and *rufescens* and *Holbölli* are intermediate between the two extremes in this respect. The females of every age, and the very young males, either want entirely this rosy on the breast and rump, or else show but very slight traces of it. All the species are streaked above; the feathers having very dark centres and light borders; but in *fuscescens* and *rostratus* these borders are so narrow that the parts appear almost uniformly dusky. In *canescens* and *exilipes* these streaks disappear on the rump, leaving that part pure white: in the other species of the genus the rump is thickly streaked. In all, the sides of the body are more or less streaked with dusky; and here the same rule holds good as with regard to the rosy of the breast. In the darkest colored species—*A. fuscescens* and *rostratus*—the streaks are most numerous, darkest, and most distinctly defined: they become less numerous and distinct in *linarius* and *exilipes*, and are sometimes almost wanting in *canescens*. In the females these streaks extend quite across the breast.

It will thus be seen that the species of the genus are all very closely related; the characters, when taken from the colors, being chiefly those of intensity, and when based upon form, being found in the varying combination of several features. *A. rostratus*, indeed, differs from the others in the possession of a much larger and more turgid bill; but as the other characters agree strictly with the type, and especially as the transition from one extreme to the other, 1861.]

through *fuscescens* and *Hollölli*, is gradual, we see not the slightest cause for separating it, even sub-generically. Moreover, if distinctions were founded upon size of bill, there is no reason why a similar discrepancy in the size and proportions of the feet should not be made the grounds of division, and thus it would be necessary to separate the *A. canescens* and *exilipes*;—a procedure hardly warrantable. We think it probable that the genus, as far as can be judged from the species now known to compose it, is incapable of a natural division.

Throughout this genus the most tangible evidence of immaturity, next to the absence of the rosy tints on the breast and rump, lies in the presence of a general yellowish or rufous suffusion, particularly about the head and fore-parts of the body. This is accompanied by a general indistinctness of outline of the streaks, the dusky being bordered with reddish, which fades insensibly into the white ground color. Indeed, we are of opinion that this rule is capable of much more extensive application, embracing perhaps the greater part of the genera of the *Fringillidæ* the species of which are streaked. It is very evident in young specimens of *Passerculus savanna*, *Poecetes gramineus*, *Melospiza melodia*, and other allied species, and in some species of *Plectrophanes*, the females of which resemble the streaked sparrows very closely. Moreover, in some species, as for example, the *Spizella socialis* and *Coturniculus passerinus*, the presence of streaks below is an evidence of immaturity, these streaks entirely disappearing when the bird is fully adult.

The "theory of variation," then, in this genus, so far as regards the plumage, would seem to be essentially the same as that which is most usual throughout the family, though agreeing most closely with that exhibited by the *Spizellinæ* (of Baird, as defined by that author). The sexual variations, however, in the absence in the female, of the red which is the most conspicuous color of the male, is precisely the same as is seen in allied coccothraustine types, such as *Pinicola*, *Carpodacus*, *Curvirostra*, etc.

*Geographical Distribution.*—The genus is entirely confined to the Northern hemisphere, being unknown in Africa or South America. It is, moreover, emphatically a boreal genus, all the species inhabiting high latitudes, and only coming south during the winter. The species, as far as now known, are very equally distributed. One is common to Europe and America; two are peculiar to America; two to Europe; and two inhabit the neutral ground of Greenland. Both the latter, however, are probably found at times in Europe, and may also very possibly be detected on our own continent.

*Comparison with allied Genera.*—The genus is most closely allied to *Cannabina*, a European form, with *Fringilla cannabina* Linn., as type, both having much the same general form and appearance. The differences, however, are readily appreciable, and quite sufficient to separate the two. In *Linota* the bill is much larger, stouter and more turgid, and less compressed and acute, and the nasal plumuli are very much shorter. The feet are larger and stronger, the toes especially much longer, the middle one, without the claw, being nearly as long as the tarsus. The hind toe is as long as its claw. The tail is shorter, less forked, its feathers much narrower and more acute. The wings are much the same. The general pattern of coloration is the same; but the colors of the back are in well defined areas; the throat is streaked; the tail and wings with very broad well defined white edges, etc. Apparently the most essential distinctive characters are those lying in the feet. *Leucosticte* is the most closely allied North American genus, agreeing with *Ægiothus* in many respects. It differs, however, in a stouter, more turgid, less compressed and acute bill, with its decidedly convex culmen; in the presence of ridges on the lower mandible. The tail is much less forked, and the feathers are even broader, with more obtuse tips. The feet are much the same; but the lateral toes, in comparison with the middle, are shorter. The claws are shorter. *Chrysomitris*, with *Fringilla spinus* L., as type, has even a more compressed, attenuated and acute bill, but the culmen is much curved; the nasal plumuli are exceedingly short; the

tail is very much shorter, with narrower and more acute feathers; and the toes, especially the hinder one, are longer. The differences from the other more or less closely allied genera,—*Carpodacus*, *Curvirostra*, *Carduelis*, etc.,—are too great to require special comparison.

The following brief schedule will serve to determine the species:—

*Synopsis of Species.*

A. Middle toe and claw equal to the tarsus. Rump streaked with dusky at all ages and seasons.

I. Bill dusky; dusky predominating above; sides very distinctly streaked; wings and tail very narrowly edged with whitish; breast in adult deep carmine.

1. Bill enormously large, arched, the culmen convex. Length 6.00; wing, 3.25; tail, 2.70; bill, 0.41; tarsus, 0.68; middle toe alone, 0.41 ..... *rostratus*.
2. Similar; smaller; bill less arched; culmen straight. Length, 5.25; wing, 2.90; tail, 2.35; bill, 0.25; tarsus, 0.58; middle toe, 0.36..... *fuscescens*.

II. Bill mostly yellow. Yellowish predominating above; sides confluent streaked; wings and tail broadly margined with whitish; breast in adult bright rosy.

3. Bill bright yellow, elongated, robust; plumuli short; lores and a large gular spot black. Length, 5½ inches (Bp.) *Holl*.
4. Smaller; bill exceedingly acute, yellow, culmen and gonys black. Rump white, streaked with dusky. Tail, 2.65 inches..... *linarius*.
5. Similar, but smaller; tail scarcely 2 inches; rump tinged with reddish..... *rufescens*.

B. Middle toe and claw shorter than the tarsus. Rump never streaked in adult males.

III. General colors light. Breast light rosy.

6. Size of *linarius*. Feet short and weak. Tarsus 0.55; middle toe 0.28..... *exilipes*.
7. Much larger. Feet long and strong. Tarsus 0.65; middle toe 0.30..... *canescens*.

The following table will exhibit the comparative measurements of the species, and, to some extent, the amount of variation to which they are subject:—

*Comparative Measurements of Species.*

Name.	Sex.	Length	Extent.	Wing.	Tail.	Bill.	Tarsus.	Middle Toe.	Its claw.
<i>A. rostratus</i> .....	♂	6.00*	.....	3.25	2.70	0.41	0.68	0.41	0.24
do. ....	♀	5.50*	.....	3.05	2.55	0.40	0.60	0.38	0.20
do. ....	♂	5.70*	.....	3.05	2.45	0.41	0.66	0.40	0.26
<i>A. fuscescens</i> .....	♂	5.25	8.80	2.85	2.35	0.35	0.58	0.36	0.19
do. ....	♀	5.20	8.60	2.80	2.35	0.32	0.58	0.36	0.19
do. ....	♂	5.30	9.00	2.90	2.35	0.34	0.59	0.37	0.22
<i>A. rufescens</i> †.....	♂	4.50	.....	2.55	2.00	0.29	0.44	0.29	.....
<i>A. linarius</i> .....	♂	5.50	9.00	3.08	2.65	0.34	0.56	0.35	0.22
do. ....	♀	5.40	8.90	2.95	2.55	0.34	0.58	0.35	0.23
do. ....	♂	5.20	8.50	2.80	2.20	0.32	0.57	0.34	0.23
do. (Eur.sp)	♂	.....	.....	2.95	2.35	0.33	0.60	0.37	0.24
<i>A. Holbölli</i> †.....	♂	5.25	.....	2.83	2.25	0.37	0.54	0.33	0.20
<i>A. exilipes</i> .....	♂	.....	9.00	3.00	2.55	0.30	0.55	0.28	0.25
do. ....	♀	.....	.....	2.85	2.50	0.30	0.54	0.29	0.20
do. ....	♂	.....	.....	3.08	2.55	0.34	0.58	0.30	0.25
<i>A. canescens</i> .....	♂	6.00*	.....	3.25	2.75	0.33	0.65	0.28	0.28
do. ....	♀	6.00*	.....	3.30	2.82	0.34	0.65	0.30	0.28

\* Of skin. † Measurements taken from Bp and Schl.

*Discussion of Synonyms.*—As will be seen by the list given at the head of this article, the genus has quite a number of partial and entire synonyms. This has been caused partly by the fact that there are several forms more or less intimately related, to which the present has been referred; and partly by the fact that the two names which have been in most general use for this group,—*Linaria* and *Acanthis*,—were both first used in a different connection; the former designating a genus of plants, the latter a genus of birds distinct from the present. Fortunately, however, it is not difficult to refer all the synonyms to their proper types, and determine the name to be employed. We take them up in order.

The type of the genus is presented by Linnæus as a *Fringilla*, and subsequently referred by Pallus to *Passer*. The bird is also given by Koch as *Spinus linaria*, being considered by that author as belonging to the same genus as the *Carduelis elegans* (!) (*Fringilla carduelis* of Linnæus), which is the type of *Spinus*. These three names, therefore, become partial synonyms.

*Linaria* is first used for this genus by Cuvier, in 1817. Bechstein, however, in 1802, applies this name to the *Fringilla cannabina* Linn., and if the name is to be retained for any genus of birds, it must be for that one of which the *F. cannabina* is the type. But Bechstein's name is itself superseded by *Linaria* of Tournefort, of 1717, which is the designation of a genus of plants; since, according to the rules of nomenclature, the name cannot be again employed in any other connexion.

*Linota* of Bonaparte, of 1838, has as its type *Fring. cannabina* Linn.; but becomes a partial synonym of the present genus because that author included in it the *Fring. linaria* Linn., at that time considering the two forms as only sub-generically distinct. *Linota*, however, in any event, would have to yield to *Cannabina* of Brehm, of 1828, which is based upon the same type (*Fring. cannabina* Linn.), and has priority.

"*Acanthis*, Keys. et Bl." (1840), is used by Bonaparte in his *Conspectus* for this genus. The type of *Acanthis* of Keyserling and Blasius is, however, the *Fringilla spinus* Linn., a form generically distinct from the one now under consideration, and the name consequently cannot be used in this connection. But even if it were based upon the *Fringilla linaria* Linn., it would be superseded by *Acanthis* of Meyer (1822), and of Bechstein (1802), both of which are founded upon a different type (*Fringilla carduelis* Linn.), and have priority in point of date.

Thus it happened, somewhat singularly, that up to the year 1851, this very marked and well known genus had received no tenable distinctive name. At that date *Ægiothus* was proposed by Cabanis, and is now in general use.

We quote *Linocanthis* Des Murs, 1853, upon the authority of G. R. Gray, not having an opportunity of verifying it. The identification of the names of Bechstein and Koch in the preceding paragraphs, are upon the authority of Cabanis.

*ÆGIOTHUS ROSTRATUS* Coues. Nov. sp.

*Diag.*—A. *Ægiotho fuscescenti* coloribus similis, sed multo major (A. canescenti staturâ par.) rostro maximo, robustissimo, arcuato, fusco; ventre plerumque fusco-striato.

Mas nupt. temp. pectore carmesino, uropygió rosaceo.

Fem. et mar juv. colores hæc desunt.

Long. 6·00 poll. ala 3·25, cauda 2·70; rostr. long. 0·41.  
tarsus 0·68, dig. med. 0·41, ung. 0·24.

*Hab.* Groenlandia. Eur. bor. Amer. Sept. bor ?

*Description.* (Male, adult, summer plumage; Jacobshavn, Greenland). The bill is enormously large for this genus, but very slightly compressed, the tip but little acute; the lateral outline is nearly straight; the culmen and gony are both decidedly convex, and much rounded, having but slight indications of

[Nov.

the sharp ridge of *linarius*. The commissure is about straight; but the depression of the tip of the upper mandible, which gives the convexity to the culmen, causes it to be a little decurved. The bill is higher than broad at the base, and so vaulted and arched as to resemble that of *Cannabina* or even *Carpodacus* rather than of *Aegithus*. It is mostly of a dusky horn color, but the cutting edges, and a great portion of the lower mandible are light bluish horn color. The nasal plumuli are short, scarcely covering more than the basal third of the bill, and are rather scant. The front, lores and a gular spot are dusky, as in all other species of the genus, the feathers of the former having slightly wavy tips. The pileum is deep crimson. The sides and back of the head and neck, and the upper parts generally to the rump, are blackish brown, scarcely relieved by the dull brownish yellow which margins the feathers so very narrowly as to give an almost uniform dusky aspect to those parts. The rump, though lighter than the rest of the upper parts, is so merely in consequence of the fading of the dull yellowish margins of the feathers into white, it being streaked with dusky almost or quite as thickly as the back itself. The wings and tail are deep dusky brown, very narrowly margined with whitish, most conspicuous on the inner secondaries, but even there much narrower than in any other species except *fuscescens*. The light borders and tips of the median and greater coverts are also reduced to a minimum, being scarcely broader than the margins of the primaries. The under parts are dull white; the sides of the neck, breast and body, and the under tail coverts thickly streaked with well defined lines of deep dusky; the throat, breast, sides of the head and body, and the rump, suffused with rosy, which deepens into carmine on the breast, and is palest on the rump and sides under the wings. The streaks on the sides of the body extend quite across the lower part of the breast; but the middle of the belly and the abdomen are unspotted. The feet are brownish black, large and stout, but are not disproportionate to the size of the bird. They have much the same comparative size and relative proportions of tarsus and toe, as in *linarius* or *fuscescens*. The claws are all short, blunt and little curved, even more so than in *fuscescens*, and differing greatly in this respect from *canescens*, the only species of the genus which equals it in size of body, or in the absolute size of the feet. In the forking of the tail and the proportion of the primaries, it does not differ materially from other species.

*Variations by sex, age, &c.*—The adult female in summer plumage differs in being notably smaller, though the general proportions, and the shape of the bill are preserved. The crimson pileum is greatly restricted. There is only a barely appreciable tinge of rosy on the breast, and none at all on the rump. The breast is instead thickly streaked, like the sides, with well defined dusty lines and spots.

Immature males, and old males in winter, differ from the adult males in summer, merely in having the rosy or carmine much less vivid and more restricted, the feathers of the breast being tipped with whitish.

Very young birds of both sexes differ, as is usual in this genus, from the adults, in a general rufous or yellowish suffusion, more or less intense, especially about the head and breast; and in a general want of the distinct definition of the dusky streaks, which have reddish borders, and fade insensibly into whitish. The streaks on the under parts appear to be more numerous, the middle of the belly only being free from them. In a specimen before us, the rufous suffusion is more decided than we have ever seen it even in *linarius*, its color being deeper and darker, as we should expect from the much darker colors of the adult birds. Immature specimens have frequently the much restricted pileum of a bright coppery rather than deep crimson tint.

*Accidental variations.*—With but a small series of specimens—only nine in number—we are unable to present the variations to which the species is subject as fully as might be desired. As far, however, as we can judge from the specimens before us, they are inconsiderable. But even if they were very

great, the species is so marked, and so distinct from any other that there would be no difficulty in recognizing it. The difference in the length of wing of the largest male and smallest female before me is barely three-eighths of an inch. The bill constantly preserves its peculiar size and shape, and in very young birds, still in the downy state, is quite different from that of any other species. The color of the upper parts hardly varies appreciably. The edgings of the wings differ somewhat in breadth, but are never so broad as those of *linarius*. The claws vary considerably in acuteness and amount of curvature; the difference, however, being caused apparently by a greater or less amount of wearing away of the sharp tips.

*Comparison with allied species.*—The present species, possessing such marked characters, hardly requires comparison with any other except *fuscescens*. As already stated, it is much larger than that species, the difference in the length of the wings being nearly half an inch. The next greatest difference is seen in the bills. That of *A. fuscescens* is larger and every way stouter than that of *linarius*, but the differences between *fuscescens* and *rostratus* in this respect are even greater. As regards color, the two are almost identical, except that in *rostratus* the dusky streaks of the sides usually extend quite across the lower part of the breast.

From *A. linarius* and still more from *A. rufescens*, the differences are sufficiently obvious. It differs in color exactly as does *fuscescens*, and, in addition, in the greatly superior size, and the enormously large bill. *A. Holbølli* has a long and robust bill; but it is bright yellow, not dusky horn color; and the general colors of the bird are those of *linarius*.

In size this species about equals *A. canescens*; but here the resemblance ends. The general very dark, instead of very light colors; the heavily streaked, instead of immaculate sides; the very large and arched, instead of small and conic bill; and the very different proportions of tarsus, toes and claws, with other characters, at once separate the two.

It is unnecessary to institute a comparison with *A. exilipes*, the characters in almost every particular being exactly opposite.

*Remarks.*—It seemed to us hardly possible that so very distinct a species as the present could, at this late day, have remained undescribed. We accordingly searched with care all the authorities on the subject, which the libraries of the Smithsonian and the Academy contain, but could find no notice of it. Holbøll, Temminck and other authors, who admit the *A. canescens*, have gone considerably into detail with regard to its variations and changes of plumage, which, as well as those of *A. linarius*, are now well known, and a pretty definite "theory of variation" of the genus established. But seasonal or sexual changes of plumage, even the most abnormal, could never produce the marked difference in the size and shape of the bill, and the proportions of the feet and toes. Having therefore been unable to find any description which applies even approximately, we have ventured to impose a name, feeling quite assured, that if we are in error in so doing, some one will before long correct the mistake.

The specimens upon which the species is founded were, with one exception, received from the Copenhagen Museum, to which we are indebted for a fine series of several species, kindly transmitted for examination. They are labeled as having been obtained in Greenland.

#### ÆGIOTHUS FUSCESCENS COUES.

*Ægiothus fuscescens* Coues, Notes Ornith. Labrador, in Proc. Acad. Nat. Sci. Phil., Aug. 1860, p. 222.

*Diag.* *A. Ægiotho linario paululum minor, rostro fusco magno robusto, plumulis brevibus sparsisque, superioribus partibus fuscis vix luteo striatis, alis caudâque vix albido marginatis, lateribus distinctè nec confluentè fusco-striatis.*

[Nov.



Mas nupt. temp. uropygio rosaceo, pectore carmesino.

Fem. et mas juv. pectore albido fusco-striato.

Long. 5.25 poll.; alar. lat. 9.00; ala .2.90; cauda 2.35; rostr. 0.35; tars. 0.58; dig. med. 0.36; ung. 0.20.

*Habitat.* Amer. Sept. bor. et orient.

A detailed description of the present species, with the points in which it differs from the *linarius*, has already appeared in the Proceedings of the Academy, as above, and there is consequently no necessity for giving them here. A comparison with the *A. rostratus*, and the differences from that species, will be found under the latter head. The following additional remarks may aid in elucidating the characters of the species.

A small series of specimens from Moose Factory, Hudson's Bay, differ slightly from the Labrador types in a more elongated bill. The bill, however, still preserves the stoutness, and the dusky color of the present species, and the other characters agree strictly with my original specimens.

Several specimens have been received from Forts Resolution and Simpson, collected by Mr. Robert Kennicott, which agree in the most minute particulars with the Labrador types. Indeed, so far as we can judge from a series of twelve specimens from various localities in northern North America, the characters of the species are more constant than in any other of the genus, showing little or no tendency towards those of *linarius*, from which there is not the slightest difficulty in distinguishing it.

The figures given by Audubon in his "*Linaria minor* Ray," come much nearer to the present species than to the *A. linarius*. Moreover, we find in the collection two specimens which were received from Mr. Audubon, and which were quite probably the originals of the plate. The description, however, is undoubtedly that of the true *linarius*.

#### ÆGIOTHUS RUFESCENS (Vieill.) Cab.

*Fringilla linaria*, Temmiuck, Man. Orn. 1835, 267. Nec Linn. Nec Temm. 1820.

*Fringilla rufescens*, Vieill., Faun. Franç. 83, tab. 41, fig. 1, fide Temm. Id. Dict. Nouv. 1817, xxxi. 342.

*Linaria rufescens*, Bp. et Schl. Monogr. Lox. 1850, 50, tab. 54.

"*Linaria minor*, Ray, Gould, Birds Eur. 1843, iii. tab. 194," secundum Bp. et Schl.

*Linaria flavivirostris, septentrionalis, canigularis*, Brehm, Vog. Deuts. sec. Bp.

*Linaria rubra* Gesn.; *L. minima* Br. fide Bp.

*Linota linaria* Bon. Comp. List, 1838, sec. Bp.

*Diag.* *A. Ægiotho linario* simillimus, sed minor, (long. 4.50 poll.) et caudâ brevior, vix bipollicari, uropygio plus minus rufescente, fusco-striato. Long. 4 6-12 poll.; ala 2 6-12 ad 7 -12; caud. 2; rostr. 3½-12; tars. 5½-12; dig. med. 3½-12.

*Hab.* Europ.

The above diagnosis, taken chiefly from Bonaparte, is that of a European species, admitted by most modern ornithologists. Following the usual custom, we present it as distinct, though, it must be confessed, not without some doubts as to the entire propriety of such a procedure. The characters of the species, as given in the diagnosis, certainly show very slight differences from the *linarius*. The distinctive features lie entirely in the smaller size, somewhat shorter tail, and, as the name indicates, a general reddish tinge, especially on the rump. But as is well known to be the case in this genus, the young of all the species have this reddish or yellowish suffusion; and in none is it more marked than in the *linarius*. A specimen of *linarius* from North America now before me, compared with a *rufescens* from Europe, has the rufous tinge everywhere much stronger than in the European bird, especially on the rump. We 1861.]

think that this character is hardly a tangible one by which to separate the two. The length (4.50 inches) and the length of tail ("barely two inches.") assigned to the species might be sufficient to separate, were it not for the fact that specimens of *linarius* are to be found, by comparing large series, which approach large specimens of *rufescens* very closely. In one of these from North America now before us, the tail barely exceeds that of a *rufescens* appreciably. Still, as we have never seen, out of a large series of specimens, any individuals of *linarius* so small as to measure only 4.50 inches in length, and especially as the species is admitted by so many ornithologists, we have concluded to present it as distinct. We do not consider that the fact of the occasional occurrence of specimens of two nearly allied species which cannot be distinguished without difficulty as any proof of the specific identity of the two; and, moreover, the few specimens we have examined may not present, typically, the characters of the species.

*Acanthis rufescens* is given by Bonaparte and Schlegel, in their very valuable work, the "Monographie des Loxiens," rather as a sub-species, or race of *linarius*, than as entitled to full specific rank. Bonaparte, however, in his *Conspectus*, considers its characters as of full specific value. The two authors first mentioned speak of it as follows: "Elle offre quelquefois des teintes, plus vives que le sizerin commun; mais il paraît encore exister, entre ces deux oiseaux, par rapport à la taille, un passage gradual, absolument comme celui qui nous avons signalé entre le sizerin commun et celui d'Holböll." "Nous avons vu que le sizerin d'Holböll se distingue du sizerin commun par une taille plus fort; la *race*"—the italics are ours—"dont nous nous occupons maintenant s'en éloigne en sens contraire, c'est à dire par une taille plus petite."

It should be borne in mind that Temminck, whose authority in matters of this sort is deservedly high, takes every opportunity of strenuously denying the existence of the *A. rufescens*. He accounts for the discrepancies in size in the following manner: "Il existe, dans cette espèce"—*A. linarius*—"comme chez la *Fringilla cannabina*, *Fringilla phyrhula*, *Alauda cristata*, *Perdix cinerea*, et chez plusieurs espèces d'oiseaux de marais, des individus, souvent des compagnies entières, dont les dimensions sont moins fortes; nous avons observés que ces variétés plus ou moins constantes dépendent de causes purement accidentelles et locales. Il me paraît qu'il est ainsi du *Sizerin* et du prétendu *Cabaret*, qu'on veut faire passer comme deux espèces distinctes."

The *Fringilla linaria* of Temminck, of 1820, is the true *linaria*: but Temminck's *linaria* of 1835 is as certainly the present species, race, or variety, whichever it is to be considered. That author, in his brief diagnosis, dwells especially upon the small size, and the brownish rump; and alters the dimensions from five inches (which is more nearly correct for the true *linaria*), to "quatre pouces cinq ou six lignes," which can only refer to the present species. This identification of his *linarius* of 1835 is moreover rendered necessary by the synonyms adduced.

#### ÆGIOTHUS LINARIUS (Linn.) Cab.

- Fringilla linaria*, Linn. Syst. Nat. i. 1766, 322; auctorumque antiq. plerique.  
 Temm. Man. Orn. 1820, 373; nec Temm. 1835.  
*Fringilla (Acanthis) linaria*, Keys. et Blas., Wirb. Eur. 1840, 161; num. 115.  
*Passer linaria*, Pallas, Zoog. Rosso-As. 1811, ii. 25.  
*Spinus linarius*, Koch, Syst. baier. Zool. 233; fide Cab.  
*Linota linaria*, Holb. F. Grœn. 1246, 29.  
*Acanthis linaria*, Bp., Consp. Av. 1850, i. 541. Bp. et Schleg. Monogr. Lox. 48, <sup>pl.</sup> tab. 52.  
*Ægiothus linarius*, Cab., Mus. Hein. 1851, 161. Bd. Gen. Rep. 1858, 428.  
*Linaria minor*, Ray, Sw. et Rich. F. B. A. 1831, ii. 267.  
*Fringilla borealis*, Vieill., Nouv. Dict. xxxi. 341; nec Temm. quae *Linaria canescens*, Gould.  
*Linota borealis*, Bp., Ind. Eur. Av. 48.

*Diag.*—A. rostro tenue, acutissimo, compresso, flavo, plumulis hand densis ad medium porrectis, superioribus partibus luteis fusco-striatis, lateribus uropygioque semper fusco-striatis, pedibus mediocribus, digito medio cum ungue tarso aequale.

Mas nupt. temp. jugulo, pectore, lateribus, uropygioque roseo tinctis.

Fem. et mas juv. pectore uropygioque albidis, fusco-striatis.

Long. 5.50 poll. ; alar. lat. 9.00 ; ala. 3.00 ; cauda 2.50 ; rostr. 0.34 ; tarsus 0.56 ; dig. med. 0.35 ; ungu. 0.22.

*Hab.* Amer. Sept., præcip. bor. ; Europ. Asia.

*Description.* (Adult male, in breeding plumage).—The bill is small, slender, exceedingly acute, much compressed, higher than broad at the base, the lateral line very concave ; the culmen and gony are about straight ; the commissure appears straight to the angle, but the cutting edge of the lower mandible has a considerable lobe towards the base, which being incurved, is concealed by the overlapping edges of the upper mandible in the closed bill. The bill is bright yellow, except the culmen and gony, which are dusky. The nasal plumuli, though not very dense, are considerably lengthened, extending over half the bill. The front, lores and a rather small gular spot are blackish ; but the feathers of the first have whitish tips, which give it a hoary appearance. There is a superciliary streak somewhat lighter than the adjacent parts, but it is illy defined. The entire crown is deep crimson, as in full plumaged birds of all the species of the genus. The sides and back of the head and neck, the upper parts generally to the rump, the scapulars and lesser wing coverts, are variegated with blackish brown and dingy yellowish ; each feather having its central portion of the former color, its edges and tip of the latter. On the rump the yellowish mostly disappears, that part being streaked with dusky and pure white. The wings and tail are brownish black or deep dusky ; the latter all round, the former only on the outer vanes edged with whitish. The edging is very narrow on the primaries, but on the inner secondaries and tertiaries becomes broad and conspicuous. The median and greater coverts are narrowly edged and broadly tipped with white, with a tinge of yellowish, forming two transverse bars on the wings. The throat, breast, sides to some distance, with the rump, are tinged with carmine, deepest on the breast, faintest on the rump. This color, though brighter than in *canescens*, or *exilipes*, never becomes as deep a crimson as is seen in *fuscescens*, having always more of a rosy tint. It extends along the throat, not however encroaching on the sides of the neck, quite to the dark gular spot, which it does not invade, but extends on the sides of the head almost to the eyes. Along the sides of the body it reaches quite to the tibiæ, further than on the middle of the belly. There are no dusky streaks across the breast ; but these extend along the sides. They are pretty numerous, much more so than in *exilipes*, and quite dark ; but they are illy defined, and more or less confluent, lacking the sharpness of outline of *fuscescens*. The under tail coverts have dusky shaft lines. The feet are deep brownish black, moderately long and stout ; the middle toe with its claw about equal to the tarsus. The claws are moderately long, curved and acute, and black.

*Variations by sex, age, &c.*—The old males in winter plumage differ from those in summer merely in having the crimson of the crown less intense ; the rosy of the breast and rump lighter and more restricted, the feathers of the breast being tipped with whitish for a greater or less extent ; and in a rather more notable amount of yellowish, especially observable on the rump and sides of the breast.

The adult females either want entirely, or have but very slight traces of the rosy of the male on the breast and rump. The latter is generally, except in wanting the rosy tint, much as in the male ; but the breast has instead a light dingy yellowish wash, and is streaked quite across with dusky. The female is, moreover, usually smaller than the male.

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Immature birds of both sexes hardly differ from each other, except that the young males soon show slight traces of the rosy, which the young females entirely want. The young of both sexes may, however, be readily recognized by the presence of a general yellowish or buffy suffusion, especially about the head and neck, more or less conspicuous. This is sometimes so marked in character as to cause the bird to be streaked above with dusky and *reddish brown*, and to have the sides of the head and neck, the breast and the sides of the body yellowish brown. The lateral streaks are more indistinctly defined, having borders of the prevailing reddish, which fades insensibly into white. The white edgings of the wings and tail partake of the general buff tinge. At this age also the crimson of the crown is restricted to scarcely more than a frontal patch, and has often a coppery or brazen rather than a deep crimson color.

*Accidental variations.*—Although this species is common with others of the genus, varies somewhat in size and proportions, in addition to the sexual and seasonal changes to which it is subject, the variations are within narrow limits, and the species readily recognizable through all of them. In a very large series (over fifty in number) from Europe and various localities in North America, the greatest difference in length is hardly over one-third of an inch. The difference in length of wing is about .25 of an inch. The feet do not differ appreciably in length or stoutness, though the claws vary somewhat in length and amount of curvature. The bill is usually very constant, preserving its attenuation and acuteness. Its color, however, differs; sometimes the upper mandible, more rarely the greater part of the lower, are dusky; and on the other hand, the usual gamboge yellow is so bright as to become chrome. The proportions of the quills vary considerably. Usually the second is longest, the first and third equal and nearly equalling the second; the fourth a little, and the fifth considerably shorter. Sometimes the first three are about equal; sometimes the first is absolutely longest: and, again, the fourth is so long, or the first so short, as to cause them to become equal. The variations in plumage, other than those of sex and age, already adverted to, are unimportant. The rump is, in all ages and seasons, conspicuously streaked.

*Comparison with allied species.*—The present species having been taken at the standard of comparison, the differences between it and other species will be found detailed under their respective headings.

In a critical and extended examination and comparison of an extensive series of specimens from both continents, I have been unable to detect any characters by which to separate the American and European birds. They appear to be absolutely identical.

*Discussion of synonymy.*—Although this species has a large number of synonyms, these arise chiefly from the numerous genera to which it has been referred. The only points which need discussion here are the following:

The *Fringilla borealis* Vieill. (not of Temminck,) is certainly the present species, although Temminck places it as a synonym of his *F. borealis*, which is *Linaria canescens* Gould. No description accompanies the *Linota borealis* of Bonaparte's "Index Europeanum Avium." That author quotes *Fringilla linaria* Ray, and *Fring. borealis* Vieill., which would cause his *Linota borealis* to become a synonym of the present species; but, if so, he is in error in adding *Linaria canescens* Gould. It is most probable, however, that he was at that time indisposed to admit the latter as a distinct species. The identification of his *Linota borealis* with the present species is, moreover, rendered necessary by the synonyms adduced to his *Linota linaria*, (*Linaria rubra* Gesn., and *L. rufescens* Vieill.) causing the latter to refer to the smaller species, as a synonym of which Bonaparte himself, in his *Conspectus*, considers it.

The *Linaria minor* Ray, of Swainson's *Fauna Boreali-Americana*, is the true *A. linarius* of North America. *L. minor* Ray, of Gould's *Birds of Europe*, is considered by Bonaparte and Schlegel as referring to the *A. rufescens*. With-

out the original description of Ray before us, we are unable to say to which of the two species his *L. minor* refers.

ÆGIOTHUS HOLBOELLI (Brehm) Cab.

*Linaria borealis*, Schleg. fide Bp.; nec Vieill.; nec Temm. 1820, nec Temm. 1835, nec Aud., nec *Linota bor.* Bp.

*Linaria Holboelli*, Brehm., Vög. Deutschl. 280.

*Acanthis Holbölli*, Bp. et Schleg. Monogr. Lox. 1850, 50, pl. 53.—Bp. Conspect. Av. 1850, 541.

*Diag.*—*A. Ægiotio linario* major, rostro flavissimo, maximo, robustissimo, elongato, basi tantum plumulis, tecto; macula gulæ extensa lorisque nigris; vertice rubro; pectore uropygioque rosaceis.

Long. 5 3-12 poll.; Ala. 2 10-12 ad 2 11-12; cauda 2 2-12, rostr. long. 4½-12 ad 4¾-12, alt. 3-12, lat. 2¼-12; tarsus 6½-12; dig. med. 4-12, ung. 2½-12; hallux 2½-12, ung. 3½-12.

Hab. Eur. bor. et occid.

The preceding diagnosis is of a species, which, like the *A. rufescens*, is so closely allied to the *A. linarius* as to render it a matter of some doubt whether it be anything more than a variety or race of that species. Its characters lie in the somewhat larger size, and the very large bright yellow bill with its short plumuli. Never having had an opportunity of examining a specimen of this species, there being none in the Museum of the Smithsonian Institute, or of the Philadelphia Academy, we can express no opinion with regard to its relationships to the *A. linaria*. It is, we believe, admitted as a distinct species by most later ornithologists, though Bonaparte and Schlegel, in their Monograph of the *Loxia*, place it in the same category as the *A. rufescens*. Having nothing to offer respecting it, we take the liberty of transcribing the remarks made by the authors just mentioned:

“Cette race du Sizerin ressemble sous tous les rapports à l'espèce précédente,” —*A. linarius*—“mais elle est d'une taille plus forte, et son bec est plus long et plus robuste. Elle est beaucoup plus rare que le Sizerin commun et la petite race appelée Cabaret ou *Ac. rufescens*. Nous avons examiné un nombre assez considerable d'individus pris en Saxe et en Belgique. On trouve quelquefois des individus intermédiaires entre cette race et le Sizerin, de sorte qu'il existe entre ces oiseaux, un passage semblable à celui qui a lieu entre les Bec-croisés grand et ordinaire.”

Temminck places this species (“*Holböll's Leinfink*” of Brehm) as a synonym of his *Fringilla borealis*. This, however, is an error, his *F. borealis* being the *Linaria canescens* of Gould.

We quote *Linaria borealis* Schleg. on the authority of Bonaparte's Conspectus. It is, so far as we can learn, the only instance of the application of the name *borealis* to this species. A discussion of *Linota borealis* Bp. will be found under *A. linarius*.

ÆGIOTHUS EXILIPES Coues. Nov. sp.

*Fringilla borealis*, Aud. Orn. Biog. v. 1837, 87; pl. 400; nec Vieill.

*Linaria borealis*, “Temm.” Aud. B. Am. 1841, iii. 120; pl. 178, nec Temm.

*Ægiotius canescens*, Ross, Edin. Phil. Journ. Jan. 1861, 163. *Minime Auctorum*.

*Diag.*—*A. Ægiotio linario* similis, ejusdemque staturæ; rostro plerumque parvo, (sed variante) acuto, conico, magna ex parte fusco; plumulis densissimis, sed brevibus; fronte canescente, loris gulæque macula, atris; uropygio candido, immaculato, lateribus striis paucis confluentibus fuscis; pedibus parvis exilibusque, digitis brevibus; medio cum ungue tarso brevior.

Mas nupt. temp. pectore uropygioque rosaceis.

Fem. et mar. juv. hic color deest.

Long. 5.50 poll.; alar. ext. 9.00 · ala, 3.00; cauda, 2.50; tarsus, 0.30; digit. med. 0.28; ung. 0.22.

Hab. America Sep. bor.

*Description*.—[No. 19,686, adult male, Fort Simpson, 30 Apr. 1860.] The bill is small, short, stout, thick at the base, regularly conical, somewhat compressed, but not so much so as in *A. linarius*, dusky throughout, except the cutting edges. The tip of the upper mandible slightly overhangs that of the lower. The culmen, gonys, and commissure from the angle are all about straight. The nasal plumuli are exceedingly full, dense and heavy, reaching about half way to the top of the bill. They are very much heavier than in *linarius*, and though absolutely shorter than in that species, they are comparatively as long, owing to the smaller size of the bill. The front is dusky like the lores, and more broadly so than *linarius*, but the feathers are tipped with whitish, which gives the forehead a hoary appearance. There is an appreciable light superciliary streak, more distinct than in *linarius*. The lores, and a gular spot are dusky. The crown is deep crimson, exactly as in *linarius*. The general color of the upper part is that of *linarius*; but the dusky streaks are smaller, more numerous and indistinct, especially on the anterior portions of the back; the yellowish is much lighter than in *linarius*, approaching to white. Towards the rump the yellowish tint disappears before the streaks do, leaving a space streaked with dusky and pure white. The rump is pure white, immaculate, with a delicate light rosy tinge. The upper tail coverts have slightly dusky centres. The wings and tail are much as in *linarius*. The primaries are very narrowly edged and tipped with white, the edging becoming quite broad on the inner secondaries. The median and greater coverts are narrowly edged, and broadly tipped with white, forming two transverse bars. The second primary is longest; the first and third equal and scarcely shorter; the fourth a little less, the fifth very much shorter. The under parts are white the throat, breast and belly with a light tinge of rosy, many shades lighter than in specimens of *linarius* of the same age and season. The sides are streaked with dusky; but the streaks are very sparse, and ill-defined, much more so than in *linarius*. The under tail-coverts are almost immaculate. The feet are brownish black, as are also the claws; the feet are much smaller, and weaker than in *linarius*, the difference being especially noticeable in the length of the toes. The middle toe without the claw is shorter than that of *linarius* by about the length of the last joint of the latter species.

*Variations by age, sex, &c.*—As is usual throughout this genus, evidences of immaturity are to be found in the faintness, or entire absence of the rosy tint of the breast and rump, these parts being lightly streaked with dusky; in the restriction of the crimson of the crown to a frontal patch, and in a general light yellowish or buffy suffusion about the head and fore-breast. The suffusion, however, does not appear to be as deep as that of *linarius*, and some other species. The females are hardly distinguishable from the young males; but the crimson of the crown has usually an orange reflection, and the breast and rump are more thickly streaked. The size appears rather less.

*Accidental Variations*.—The variations to which this species is subject, other than those of sex and age, are very great, much more so than exist in any other species of the genus. The dimensions of the whole bird; the size, shape and color of the bill; the color and number of the streaks above and on the sides; the extent and purity of the white of the rump, &c., are all liable to great variations. Indeed, almost the only character that is perfectly constant lies in the feet, in their absolute size, and the relative length of the tarsus and toes. With this variation, however, the specimens all have a general resemblance to each other, which, together with the character of the feet, render it easy to distinguish them from any other species of the genus. The precise combination of characters varies with almost every specimen; and there are, moreover, intermediates to be found between all extremes; entirely removing the doubt which might otherwise arise, as to whether there were not two or more species combined in the series of specimens.

In an extensive series, comprising thirty-seven specimens, I have found the

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variations to be as follows. The difference in total length of body is rather more than .50 of an inch. The average size is rather less than 5.50 inches. The difference in length of wing from the carpal joint is somewhat over .25 of an inch. In length of tail the differences are about the same. The feet are constant, both absolutely and relatively, the variations being scarcely appreciable. The claws, however, vary quite notably in length and amount of curvature. To express the difference in the feet of this species and the *A. linarius*, relatively without measurement, we have said that in the former the tarsus exceeds the middle toe and claw, and that in the latter the toes are equal; but this variation in the size of the claws may cause the feet not to hold good in all cases. The bills vary quite notably in size and color, they being sometimes nearly as bright yellow as in *linarius*; but they are usually almost entirely dusky, and they are never so acutely pointed and so much compressed as in that species, preserving their regular conical shape without much variation. The plumuli vary in color, from dingy whitish to dusky, but are usually of the former color, and are always heavy and full. The upper parts are usually as given in the description; lighter than in *linarius*, the conspicuous yellowish or buff of that species fading into whitish more or less pure. Sometimes, however, the upper parts are quite like *linarius*; in other specimens the dusky centres of the feathers become so broad and conspicuous as to give the prevailing color of the upper parts, causing the specimens to approach *A. fuscescens* in this respect only. In these cases, however, the light edges of the feathers, though so narrow, are nearly pure white, and the rump is very broadly pure white, entirely without streaks, forming a marked contrast. The edgings of the wings and tail do not vary notably, being always nearly identical with those of *linarius*, but perhaps a little purer. The rump in adult birds is pure white, with a rosy tinge, without spots or streaks; but in immature specimens it is frequently marked with dusky, though never so thickly as in *linarius*. The dusky streaks on the sides are usually very sparse, and though varying in number and intensity, never become so thick and dark as in *linarius*. These streaks in immature and female birds frequently extend as slight touches quite across the breast. In adult males the breast is immaculate, with a light rosy tint. In the fullest plumaged males the rosy is always several shades lighter than in the males of *linarius* of the same age.

*Comparison with allied species.*—*A. linarius* being most closely related, in the foregoing descriptions the comparisons have been made with that species. The points of difference may be summed up as follows: The smaller, more conic, less compressed, darker colored bill, with its very heavy and dense nasal plumuli; the different character of the streaks above; the white immaculate rump; the paucity of the streaks on the sides; the much lighter rosy tinge of the breast and abdomen; the smaller, every way weaker feet, with their much shorter toes.

Some specimens—the largest and lightest colored—resemble *A. canescens* in general appearance, having the same conic bill, heavy plumuli, white rumps, sparsely streaked sides, &c. They may, however, be readily distinguished by the great discrepancy in the size of the feet and claws, those parts in *canescens* being as much larger and stronger in *linarius* as they are smaller and weaker than in that species in *exilipes*.

The species requires no comparison with *A. fuscescens*, still less so with *A. rostratus*, the differences from both of those species being sufficiently obvious.

The very large, bright yellow bill, with the short plumuli of *A. Hollöti*, at once separates that species. The smaller size, more acute bill, less dense plumuli, general rufous tinge and shorter tail of *A. rufescens* will serve to distinguish it. Both these species, moreover, have the same character of feet as has the *A. linarius*.

*Discussion of synonymy.*—The only name which we have met with which can be referred to this species, is the *Fringilla*, or *Linaria borealis* Temm., of August 1861.]

dubon. The identification with the present species, rather than with the *borealis* of Temminck, which is the true *Linaria canescens*, Gould, is rendered necessary by the measurements given, especially those of the entire length, and length of tarsus. Moreover, a specimen of *exilipes* now before us agrees so minutely with Audubon's figure and description, that we have not the slightest hesitation in referring the one to the other.

In the Edinburgh Philosophical Review, as above, there is given, by Bernard R. Ross, Esq., a list of a collection of birds made by himself on Mackenzie's River. This is the same collection that was sent to the Smithsonian; and the *Ægiothus canescens* there mentioned refers to the very series of birds upon which we have based our *A. exilipes*. The mistake is, however, very pardonable, as the writer had no specimens of the true *canescens* for comparison; and affords a good example of the caution necessary to be used in identifying specimens from descriptions, especially when so brief as is the diagnosis of *A. canescens* in the General Report.

*ÆGIOTHUS CANESCENS*, (Gould,) Cab.

*Linaria canescens*, Gould, Birds Eur., 1843, iii. tab. 193.

*Linota canescens*, Bon. Comp. List, 1838.

*Acanthis canescens*, Bon. Consp. Av., 1850, 541. Bp. et Schl. Monogr. Lox., 1850, 47, tab. 51.

*Ægiothus canescens*, Cab. Mus. Hein., 1851, 161. Baird, Gen. Rep. Birds, 1858, 429.

"*Linaria Hornemanni*, Holb. Kroy. Nat. Tidsk., 1843, iv. 398."

*Linota Hornemanni*, Holb. Faun. Groen., 1846, 30.

*Fringilla borealis*, Temm. Man. Orn, 1835, 264, excl. syn. Nec Vieill.; nec

*Fring. bor. vel Linaria bor.* Aud. quæ *Æg. exilipes* Coues; nec *Linota bor.*  
Bp. quæ *Fring. linaria* L.

*Diag.*—*A. Ægiotho linario* major (long. 5.75 poll.), rostro medioeri, conico; plumulis densissimis, superioribus partibus fusco alboque striatis, inferioribus uropygioque albidis immaculatis; cauda elongata, pedibus validissimis, unguibus protractis et incurvatis.

Mas nupt. temp. pectore uropygioque roseo indutis.

Fem. et mas juv. pectore uropygioque albidis, fusco-lineatis.

Long. 6 00 poll.; cauda, 2.75; ala, 3.25; rostrum, 0.34; tarsus, 0.65; dig. med. 0.30; ung. 0.28.

*Hab.*—Groenlandia. Europ. Amer. Sept.?

*Description.*—(Adult, Greenland. From Holböll himself.) The bill is moderate, or rather small for the size of the bird, regularly conic, very stout at the base, where it is as high as long; only moderately compressed and acute; the upper mandible is mostly dusky, the lower, dusky only along the gonyes, the rest being yellowish. The nasal plumuli are very dense, and reach nearly to the middle of the bill; those between the nostrils are grayish, those on the sides of the bill much darker, of the same color as the brownish black lores and gular spot. The front is brownish black, but the feathers have broad, hoary tips. There is a pretty well defined, light superciliary streak, extending quite to the base of the bill, and including the lateral feathers of the front. The crimson pileum occupies nearly the whole of the crown. The sides of the head, sides and back of the neck and upper parts generally, are streaked with brownish black and white; the feathers have the centre of the former color, and are edged and tipped with the latter. The white is nearly pure, except on the sides of the head and neck, where it has a slight yellowish tinge. The proportions of the primaries do not differ materially from those of other species. The first, second and third are nearly equal and longest; the fourth is a little, and the fifth considerably shorter. The quills are brownish black, edged with white, very narrowly on the primaries, more broadly on the secondaries; the tips of the greater and median coverts are broadly white,

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forming two conspicuous transverse bands across the wings. The tail is brownish black, like the wings, quite broadly edged with white; and is comparatively as well as absolutely longer than in other species. The entire under parts, from the throat, together with the rump, are pure white, entirely without spots or streaks; the breast and rump having a light rosy tinge. The feet are brownish black; remarkably long and strong for this genus, exceeding in this respect those of any other species. The claws are all long, strong, greatly curved and very acute. That of the middle toe nearly or quite equals its digit, and that of the hind toe much exceeds it.

The entire plumage in this species is of a thick, soft, mollipilose character, enabling it to endure the rigors of winter in very high latitudes.

*Variations by age, sex, &c.*—Immature birds, though preserving the general characteristics and appearance of the adults, differ in several respects. The changes are entirely analogous to those adverted to under *A. exilipes*. The pure white edgings of the feathers of the upper parts and wings become tinged with yellowish, more or less intense, especially about the head and neck, where there is a general buffy suffusion. This yellowish sometimes becomes very bright and conspicuous. The crimson on the crown is restricted to a patch extending scarcely half way to the occiput. The nasal plumuli and the front are more yellowish, and the dusky lores and gular spot more restricted. The bill is yellowish, except along the culmen and gonys. There is little or no indication of the rosy on the breast and rump, which, instead, are sparsely streaked with narrow lines of dusky.

According to Holböll, the summer plumage differs from that of winter, chiefly by the narrower whitish edgings of the feathers. The bill is entirely dusky, except along the cutting edges, and very thick, being as broad as high. The old females, and the young males after the first moult, differ from the adult males in winter plumage in the entire absence of the rosy on the breast and rump, and in the less purity of the white beneath, the sides being lightly streaked.

Without a sufficiently extensive series of skins, I am unable to present the variations in size, proportions, &c., to which this species is subject. As, however, neither Temminck nor Holböll, as far as I can discover, make mention of them, it is to be presumed that the species is subject to no very remarkable deviations in these respects.

*Comparison with allied species.*—This species, in its large size, strong feet and claws, general light colors, white rump, &c., is too distinct to require comparison, except perhaps with *A. exilipes*. The differences will be found detailed under the head of the latter.

*Discussion of synonymy.*—We have not been able to find where *Linaria canescens* is first characterized; but, as Bonaparte, in 1838, gives a *Linota canescens*, the species must have been introduced at least as early as that date. The date of *Linota Hornemanni* is 1843; and the latter consequently loses the priority claimed for it by Holböll.

The *Fringilla borealis* of Temminck (but not of Vieillot) is undoubtedly the present species. The diagnosis and the very full description are accurate and pertinent, although the dimensions given ("longueur, cinq pouces"), is below the usual standard. But, while the description is thus applicable to the present species, the author evidently either considers his bird as quite a different one, viz., the common *linaria* of Europe and America, or else is in error with regard to the names he quotes as synonyms. For, in giving the synonymy he says: "C'est dans l'une ou l'autre de ces livrées très variables suivant la saison, la *Fringilla linaria* des auteurs tant anciens que modernes, qui ont souvent confondu les deux espèces." He then quotes as synonymous, "La *Fringille sizerin*," Vieill. (Gal. Ois. 78, pl. 65), and "Le *Sizeriu boréal*," Roux. (Orn. Prov. 165, pls. 101 and 102), both of which refer to the true *Fringilla linaria* of Linnaeus. He also, in a note under *F. linaria*, while insisting on the 1861.]

specific identity of *A. linarius* and *rufescens*, says, that—"le Sizerin boréal (*Linaria borealis*) de Vieillot forme une espèce distincte"—from *A. rufescens*—"identique de mon Gros-bec boréal de l'article précédent, mais auquel on ne doit pas réunir le Sizerin ou le Cabaret des auteurs, deux dénominations synonymes de mon Gros-bec sizerin ou *Fringilla linaria* des méthodistes;" clearly mis-identifying Vieillot's bird. In discussing Temminck's names of the *Algyiothi*, it must be borne in mind that he sturdily refuses to admit the specific distinction of *A. linarius* and *rufescens*. He moreover places as a synonym of his *Fringilla borealis*, the "Holbölls Leinfink" of Brehm., which later ornithologists, with what propriety I am unable to say, regard as a distinct species.

*Borealis* of Temminck has priority over both *canescens* Gould, and *Horne-rrianni* Holb.; but as the name was previously applied by Vieillot to the *A. linarius*, it cannot of course be retained.

This name *borealis* has been applied by four authors to as many different species, for neither of which it can stand. *Borealis* Vieillot, is the *A. linarius* (Linn.) Cab.; *borealis* Schlegel, is the *A. Holbölli* (Brehm) Cab.; *borealis* Temminck, is the *A. canescens* (Gould) Cab.; while *borealis* "Temm." of Audubon is the *A. exilipes* Coues.

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Dec. 3d.

Mr. LEA, President, in the Chair.

Twenty-two members present.

The following papers were presented for publication:

A revision of the species of *Baculites* described in Dr. Morton's Synopsis of the Cretaceous Group of the United States, by Wm. M. Gabb.

On *Squalus Americanus* Mitchell, referring it to the genus *Odonaspis* Agassiz, by C. C. Abbott.

Descriptions of the lower Silurian, Jurassic, Cretaceous and Tertiary Fossils collected in Nebraska by the Exploring Expedition under the command of Capt. W. F. Raynolds, U. S. Top. Eng., with some remarks on the rocks from which they were obtained, by F. B. Meek and F. V. Hayden, M. D.

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Dec. 10th.

Mr. LEA, President, in the Chair.

Thirty-four members present.

The following papers were presented for publication:

Descriptions of new Paleozoic Fossils from Kentucky and Indiana, by Sidney S. Lyon.

On the Mollusca of Harper's Ferry, Virginia, by George W. Tryon, jr.

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Dec. 17th.

Mr. LEA, President, in the Chair.

Twenty-seven members present.

A paper was presented for publication, entitled,

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Descriptions of three new species of Mollusca, of the genus *Sphærium*, by Temple Prime.

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*Dec. 24th.*

Mr. LEA, President, in the Chair.

Nineteen members present.

The following papers were presented for publication :

Description of a new Quadrumanous Mammal, of the genus *Midas*, by J. H. Slack, M. D.

Description of new Plants from Texas, by S. B. Buckley.

On the genera *Panolopus*, *Centropyx*, *Aristelliger* and *Sphærodactylus*, by E. D. Cope.

Descriptions of eleven new species of the genus *Unio* from the United States, by Isaac Lea.

Descriptions of seven new species of the genus *Io*, by Isaac Lea.

Monograph of the species of *Sphærium* of North and South America, by Temple Prime.

Synopsis of the recent species of *Gastrochænidæ*, by George W. Tryon.

Synopsis of the Selaginoids, by Theodore Gill.

Synopsis of the Notothenioids, by Theodore Gill

Synopsis of the Harpagiferoids, by Theodore Gill.

Synopsis of the Chænichthyoids, by Theodore Gill.

Dr. Slack presented for examination a Guide to the Collection of the Academy, to be printed for sale at the door of the Academy.

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*Dec. 31st.*

Mr. LEA, President, in the Chair.

Thirty members present.

On report of the respective committees, the following papers were ordered to be printed in the Proceedings :—

**Descriptions of Eleven New Species of the genus UNIO from the United States.**

BY ISAAC LEA.

*UNIO SQUAMEUS*.—Testâ lævi, suboblongâ, valdè compressâ, inæquilaterali, posticè obtusè angulatâ, anticè rotundâ; valvulis subcrassis, anticè paulisper crassioribus; natibus prominulis; epidermide vel rufo-fuscâ vel tenebroso-fuscâ, striatâ, infernè squamosâ, obsoletè radiatâ; dentibus cardinalibus subgrandibus, compressis, striatis, in utroque valvulo subduplicibus; lateralibus prælongis, lamellatis, obliquis subrectisque; margaritâ albâ et valdè iridescente.

*Hab.*—North Carolina. J. G. Anthony.

*UNIO ROSTRUM*.—Testâ lævi, subtriangulari, ad latere planulatâ, valdè inæquilaterali, posticè subbiangulatâ, anticè rotundâ; valvulis crassiusculis, anticè paulisper crassioribus; natibus prominulis; epidermide tenebroso-fuscâ, nigricante, eradiata; dentibus cardinalibus parvis, sulcatis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subcurvisque; margaritâ albidâ et iridescente.

*Hab.*—Davidson County, North Carolina. F. A. Genth, M. D.

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**UNIO CONTIGUUS.**—Testâ lævi, latè ellipticâ, inflatâ, inæquilaterali, posticè obtusè angulatâ, anticè rotundatâ; valvulis subcrassis, anticè crassioribus; natibus subprominentibus; epidermide tenebroso-fuscâ, valdè radiatâ; dentibus cardinalibus subgrandibus, compressis, crenulatis; lateralibus longis, lamellatis subcurvisque; margaritâ salmonis colorâ tinctâ et valdè iridescente.

*Hab.*—Stewart's Mill Dam, Union County, North Carolina. F. A. Genth, M. D.

**UNIO RIDDELLII.**—Testâ lævi, subtriangulari, valdè inflatâ, ad umbones tumidâ, posticè obtusè angulatâ, anticè rotundâ, subæquilaterali; valvulis crassis, anticè paulisper crassioribus; natibus valdè prominentibus, incurvis, ad apices plicis parvis indutis; epidermide fusco-olivâ, obsoletè radiatâ; dentibus cardinalibus parvisculis, subpyramidalis corrugatisque; lateralibus crassis, corrugatis, curtis subcurvisque; margaritâ albâ et iridescente.

*Hab.*—Dallas, Texas. Prof. C. G. Forshey.

**UNIO CHUNI.**—Testâ lævi, triangulari, inflatâ, ad umbones subtumidâ, posticè obtusè angulatâ, anticè rotundâ, subequilaterali; valvulis subcrassis, anticè crassioribus; natibus subprominentibus, subincurvis, ad apices paulisper undulatis; epidermide rufo-fuscâ, obsoletè radiatâ; dentibus cardinalibus subgrandibus, subcompressis corrugatisque; lateralibus subcrassis, corrugatis, subcurtis subrectisque; margaritâ vel albâ vel roseâ vel salmoniâ et valdè iridescente.

*Hab.*—Dallas, Texas. Prof. C. G. Forshey.

**UNIO HEERMANNII.**—Testâ alata, lævi, ellipticâ, compressâ, valdè inæquilaterali, posticè obtusè biangulatâ, anticè rotundâ; valvulis subtenuibus, anticè irregulariter crassioribus; natibus prominulis, vix undulatis; epidermide luteo-fuscâ, micanti, eradiatâ; dentibus cardinalibus parvis, subconicis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subrectisque; margaritâ pallido-salmonâ, purpurescente et intensè iridescente.

*Hab.*—Medina River, Texas. A. L. Heermann, M. D.

**UNIO TESSERULÆ.**—Testâ lævi, quadratâ, cuboideâ, valdè tumidâ, valdè inæquilaterali, posticè obtusè angulatâ, anticè truncatâ; valvulis crassis, ad apices rugoso-undulatis; epidermide melleâ, micanti, radiis interruptis indutis; dentibus cardinalibus parvisculis, subconicis corrugatisque; lateralibus curtis, obliquis rectisque; margaritâ argenteâ et valdè iridescente.

*Hab.*—Nolachucky River, Tenn. J. G. Anthony.

**UNIO NORTHAMPTONENSIS.**—Testâ lævi, oblongâ, valdè compressâ, ad latere planulatâ, posticè obtusè biangulari, anticè obliquè rotundatâ, valdè inæquilaterali; valvulis subcrassis, anticè crassioribus; natibus prominulis; epidermide vel ochraceâ vel luteo-fuscâ, obliquè radiatâ; dentibus cardinalibus crassis, striatis, in utroque valvulo duplicibus; lateralibus prælongis, validis, corrugatis, subrectis lamellatisque; margaritâ vel albâ vel purpurascete vel salmonis colore tinctâ et valdè iridescente.

*Hab.*—Connecticut River, at Northampton. At Springfield, by L. Shurtleff, M. D. Below Hartford, T. R. Ingalls, M. D. Neuse River, N. C., E. Emmons, M. D.

**UNIO WARDII.**—Testâ tuberculatâ, subtriangulari, compressâ, subæquilaterali, posticè et infernè emarginatâ, anticè rotundâ; valvulis crassiusculis, anticè crassioribus; natibus prominulis, ad apices rugosis; epidermide vel luteolâ vel luteo-virente, maculis triangularis indutis; dentibus cardinalibus subgrandibus, compressis sulcatisque; lateralibus sublongis, subcrassis, obliquis rectisque; margaritâ argenteâ, interdum roseâ et iridescente.

*Hab.*—Walhouding River, Ohio, J. C. Ward. Wasepinicon River, Iowa, Dr. Foreman. Coal River, Virginia, Dr. Hartman.

**UNIO SAMPSONII.**—Testâ lævi, oblongâ, inflatâ, ad umbones valdè tumidâ, posticè emarginatâ, anticè rotundâ, valdè inæquilaterali; valvulis crassis, an-

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ticè paulisper crassioribus; natibus prominentibus, tumidis, incurvis, ad apices vix undulatis; epidermide luteolâ, radiis viridis vestitis; dentibus cardinalibus subgrandibus, erectis corrugatisque; lateralibus crassis, curtis, corrugatis subrectisque; margaritâ argenteâ et paulisper iridescente.

*Hab.*—Wabash River, New Harmony, Indiana. James Sampson.

UNIO VESTITUS.—Testâ lævi, ellipticâ, compressâ, inæquilaterali, posticè obtusè angulatâ, anticè rotundâ; valvulis subtenuibus, anticè paulisper crassioribus; natibus prominulis; epidermide vel luteâ vel luteo-fuscâ, politâ, radiis obliquis viridis vestitis; dentibus cardinalibus parvis, compressis, acuminatis, crenulatis, in utroque valvulo duplicibus; lateralibus sublongis, lamellatis, subobliquis corrugatisque; margaritâ albidâ et splendidè iridescente.

*Hab.*—Ogechee River, Georgia. Major Le Conte and J. G. Anthony.

### Descriptions of Seven New Species of the Genus IO.

BY ISAAC LEA.

When I proposed in 1831\* to form the new genus *Io* for Mr. Say's *Fusus fluviatilis*, there were no other allied species known to naturalists. I then proposed also to change the specific name to *fusiiformis*, as being more appropriate, and I gave a figure under this name. At that time the canons of nomenclature were not so well understood nor so strict as they have since been; and it is only justice to Mr. Say to relinquish my specific name, and to replace his. Subsequently in 1834, I proposed a new species under the name of *Io spinosa*, (Trans. Am. Phil. Soc., vol. v. pl. 19, fig. 79.) More recently Mr. Anthony, in the Proceedings of the Academy, (1860,) proposed four new species; three of which I think belong to the two previously established species. Mr. Lovell Reeve, in his beautiful "Conchologia Iconica," has recently issued among his monographs one of the genus *Io* with numerous plates and full descriptions. In this he has introduced a number of species, most of which I think more appropriately belong to Prof. Haldeman's genus *Lithasia*—the species of which form a very excellent group, which he separated from *Melania* and *Anculosa*—but which Mr. Reeve does not seem to recognise. Of the true *Io* I also think he has considered several varieties as species.

IO NODOSA.—Testâ tuberculatâ, elevato-conicâ, virido-corneâ, vittatâ; spirâ regulariter conicâ; suturis valdè impressis; anfractibus instar denis, planulatis, medio tuberculatis, infâ striatis; aperturâ parviusculâ, rhomboideâ, intus vittatâ; labro acuto et sigmoideo; columellâ albâ et valdè contortâ; canali breviusculâ.

*Hab.*—Tennessee River, Alabama? † Wm. Spillman, M. D.

IO ROBUSTA.—Testâ canaliculatâ, paulisper tuberculatâ, elevato-conicâ, pallido-corneâ, infâ obsolete vittatâ; spirâ regulariter conicâ; suturis valdè impressis; anfractibus instar denis, apud apicem planulatis, infâ canaliculatâ; aperturâ parviusculâ, rhomboideâ, intus vittatâ; labro acuto et sigmoideo; columellâ pallido-salmoniâ; canali breviusculâ.

*Hab.*—Tennessee River, Alabama? Wm. Spillman, M. D.

IO VARIABILIS.—Testâ lævi, elevato-conoideâ, subfusiformi, vel vittatâ vel intensè purpureâ vel virente; spirâ regulariter conoideâ; suturis leviter impressis; anfractibus instar novenis, planulatis, in medio angulatis; aperturâ elongato-rhomboideâ; labro acuto et sinuoso; columellâ vel albidâ vel purpureâ et valdè contortâ; canali attenuato-constrictâ.

*Hab.*—Tennessee River, Alabama? Wm. Spillman, M. D.

\* Trans. Amer. Phil. Soc., January, 1831.

† Dr. Spillman simply gave Tennessee River as the habitat of these species, but did not mention what part. They are probably from Alabama.

IO MODESTA.—Testâ lævi, conicâ, virido-corneâ; spirâ regulariter conicâ; suturis impressis; anfractibus novenis, planulatis, in medio angulatis; aperturâ parvâ, regulariter rhomboideâ; labro acuto et sinuoso; columellâ albâ et valdè contortâ; canali curtâ et effusâ.

*Hab.*—Tennessee River, Alabama. Wm. Spillman, M. D.

IO SPILLMANII.—Testâ lævi, attenuato-conicâ, pallido-corneâ; spirâ regulariter conicâ, supernè striatâ; suturis leviter impressis; anfractibus instar denis, planulatis, in medio obtusè angulatis; aperturâ parvâ, rhomboideâ; labro acuto et sinuoso; columellâ albâ et valdè contortâ; canali curtâ et subeffusâ.

*Hab.*—Tennessee River, Alabama? Wm. Spillman, M. D.

IO GRACILIS.—Testâ lævi, conicâ, pallido-purpureâ; spirâ regulariter conicâ; suturis regulariter impressis; anfractibus instar novenis, planulatis, in medio angulatis; aperturâ parviusculâ, rhomboideâ; labro acuto et sinuoso; columellâ pallido-purpureâ, valdè contortâ et deflectâ; canali curtâ et latè effusâ.

*Hab.*—Coosa River, Alabama. Wm. Spillman, M. D.

IO VIRIDULA.—Testâ lævi, cylindrico-conoideâ, virente; spirâ subelevatâ; suturis parum impressis; anfractibus instar novenis, planulatis, in medio obtusè angulatis; aperturâ parviusculâ, rhomboideâ; labro acuto, sinuoso; columellâ ad basim purpureâ, parum contortâ; canali curtâ et dilatâtâ.

*Hab.*—Coosa River, Alabama. Wm. Spillman, M. D.

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A Revision of the species of *BACULITES*, described in Dr. Morton's "Synopsis of the Cretaceous Group of the United States."

BY W. M. GABB.

In the above mentioned work, Dr. Morton described six species of *Baculites*, two of which (*B. compressus* and *B. ovatus*) had been previously characterized and named by Say. All of these species were published with very short and meagre descriptions, although the illustrations were pretty accurate; the original specimens, however, are still preserved in the Museum of the Academy, and from them I have been enabled to arrive at tolerably satisfactory results, in the determination of the true relations of the several forms.

Mr. Say's species have been elaborately described and figured by Messrs. Hall and Meek in the Transactions of the American Academy of Arts and Sciences of Boston, vol. v. 2d series. I shall therefore not refer to them again, further than to say that they are very distinct from the species with which I am now occupied.

*Baculites labyrinthicus* Morton, Syn. p. 44, pl. 13, fig. 10.

This is probably the only form among those described by Dr. Morton which is entitled to rank as a valid species, unless *B. columna* should prove to be distinct from *B. carinatus* = *B. anceps*.

*Sp. char.* *B.* testâ compressiusculâ, tuberculis serie duplici positis, dorso subacuto, ventre plana, aperturâ incognitâ; septis lobatis.

Shell subcompressed, section rounded, pentagonal; dorsum acute; ventral side flattened, bounded by a row of subacute nodes on each side; midway between each of these nodes and the dorsum is another one of about the same size. Longitudinally between the nodes, the surface is slightly excavated; laterally, the excavation is almost invisible. Septum; dorsal lobe broader than the dorsal saddle, not so long as the superior lateral lobe, deeply excavated by a broad sinus in the middle, on each side of which extends a branch which is separated into one large and one small fork, the inner or largest one being trifurcate, above the outer one there is another smaller process, dorsal saddle divided for more than half its length by a long serrate process, each

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branch of the saddle being bilobate; superior lateral lobe one-fourth longer than the dorsal lobe; extremity divided into two very long slender parallel branches, the one on the dorsal side trifurcate, the other simply serrate and sometimes curved towards the other; above these on each side are two smaller processes, the upper one smallest, and those on the dorsal side somewhat larger; superior lateral saddle wider than the dorsal, of the same general form, except that the dorsal side is widest; lateral lobe about half as large as the superior lateral, bifurcate at the extremity and with one simple process above on each side; lateral saddle simple, divided at the extremity and not so large as the lobe; inferior lateral lobe about as large as the preceding saddle, serrate on the sides and bifurcate at the end; ventral saddle broader than the lateral, about as long and somewhat more profusely lobed, but not so distinctly; ventral lobe small, trifurcate at the end, and with two or three uniform processes at the sides.

Pl. iii. fig. 1 illustrates the septum and a section of this species taken from the specimen figured by Dr. Morton, loc. cit. Pl. 13, f. 10.

This species can be at once distinguished by its distinct pentagonal form and the two rows of tubercles, one at the edge of the ventral face, the other half way between these and the dorsum.

*Dimensions*.—Width, .7 in.; diameter in the middle, .5 in.; width across the nodes on the ventral side, .4 in.; width of same between the nodes, .3 in.; distance longitudinally between the nodes, .5 in. These measurements may vary slightly in different individuals, but are correct for Morton's original specimen.

*Baculites anceps* Lam., An. S. Vert. t. 7, p. 648, No. 2.

*B. vertebralis* Defr., D. Sc. Nat. t. 3, Sup. p. 160.

*B. dissimilis* Desm., Jour. de Phys. t. 85, p. 48, No. 3, pl. 2, f. 4—6.

*B. vertebralis* Blainv., Malac. pl. 12.

*B. Faujasii* Haan, Monog. Am. et Goniol. p. 155, No. 2.

*B. dissimilis* Haan, *id.* 155, No. 3.

*B. anceps* d'Orb., Desh., Brown, Hisinger et auct.

*B. carinatus* Mort., Synopsis, p. 44, pl. 13, f. 1.

*B. asper* Mort., *id.* p. 43, pl. 1, f. 12, 13, and pl. 13, fig. 2.

*B. Tippaensis* Con. Jour. Acad. Nat. Sci., 2d ser., vol. iii. p. 334, pl. 35, fig. 27.

*B. Spillmannii* Con., *id.* p. 335, pl. 35, fig. 24.

*B. testâ compressiusculâ, lævi, transversim undatâ vel tuberculatâ, dorso subacuto vel obtuso, ventre crassiore obtuso; aperturâ obliquatâ, suprâ elongatâ, acutâ, lateribus sinuatâ; angulo, 6°; septis lobatis.*

Shell subcompressed, section variable, sometimes nearly circular or ovoid, at others strongly pyriform. Dorsum subacute, marked by a flattened biangular ridge broadly rounded or undulated; ventrum always broad, regularly rounded. Sides smooth, marked by faint undulations, parallel with the border of the mouth or by large crescentic or triangular nodes, the apex always downwards. Septum: dorsal lobe about as wide as dorsal saddle, deeply emarginate in the middle, each branch with about three serrations internally and one or two externally; above the latter there are two or three processes; dorsal saddle divided in the middle, the process on the dorsal side, trilobate, the other bilobate; superior lateral lobe smaller than the dorsal, divided at the extremity into two compound processes, with two or three smaller ones above on the dorsal side, and one less on the ventral side; superior lateral saddle as wide or wider than the dorsal and marked in a similar manner; lateral lobe like the superior lateral but smaller; ventral saddle small, simple and trilobate; ventral lobe smaller than the corresponding saddle, trifurcate at the extremity and with two small processes above.

It will be seen that, notwithstanding the apparently great external differ-  
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ence between the form described by DeFrance as *B. vertebralis*, and Dr. Morton's *B. asper* (or *B. Spillmannii* Con.), still there is no character by means of which we can satisfactorily separate them. Pl. iii. fig. 2 is from the European form; figure 3 is from a young individual of Morton's *carinatus*, which is the same as the variety figured by d'Orbigny; figure 4 is from one of Morton's original specimens of *B. asper*, which is characterized by a broad dorsum and large triangular nodes. *B. Spillmannii* Con. is a distinct link between the variety *asper* and the undulated form; the nodes on Mr. Conrad's specimen of that species being elongated into prominent crescents. Between that and the rougher forms of Morton's *carinatus*, (the typical variety of *B. anceps*), it is impossible to draw a dividing line. Again, some of Dr. Morton's specimens of this last named species are perfectly smooth, while others are so rough that when I thought that distinct from *B. asper*, I did not know to which species to refer them. Mr. Conrad's *Tippaensis* is the typical form of *B. carinatus* of Morton.

We have now but one other form left, and to ascertain positively its relations, will require a larger series of specimens than I have yet seen. I refer to *B. columna* Morton, Syn., p. 44, pl. 19, fig. 8. This species was described by Dr. Morton from half a dozen fragments of about an inch in length. I have been unable to discover any trace of a septum in any of them. They are elliptical to ovate, and marked rounded, sinuous ribs which cross the dorsum, pass downwards at a slight angle to about the middle of the side where they curve and then run transversely around the ventrum. The angle at which these ribs bend upwards from the middle to the dorsum is not more than half as much as in the preceding species, but in one or two specimens I have detected another series of lines which may be lines of growth, and which would give the mouth much the shape of that in *B. anceps*. Dr. Morton's illustration of this form is almost utterly worthless. He represents the ribs separated at too great distance, and much too distinct. This direction is also incorrect; they should bend twice as abruptly from the middle toward the widest end, on the side nearest the figure of *Rostellaria pennata*, which is the dorsal side, and should be less distinct towards the ventrum, since on that side they are sometimes almost obliterated. It is by no means improbable that this is merely the young of one of the many varieties of *B. anceps*. It is certainly not a HAMITE as d'Orbigny suggested in his *Prodrome de Paléontologie Stratigraphique*.

### On the Mollusca of Harper's Ferry, Virginia.

BY GEORGE W. TRYON, JR.

In the month of June, 1859, I was called by business to Harper's Ferry, and while there, having a very brief period of leisure at my disposal, I employed it in making a collection of the shells of the vicinity. I was struck at the time with the exceeding abundance of these, both in individuals and species, and also by the prevalence of certain external characters, much more prominently marked, than in the same shells from the vicinity of Philadelphia. These peculiarities, on a recent re-inspection of the shells, have appeared to me worthy of mention; and the subject of geographical distribution may receive some new light from the publication of a list of the Mollusca of the mountainous region of Virginia. The species collected are as follows:

#### GASTEROPODA.

##### MELANIADÆ.

These shells were numerous upon the rocks in the bed of the Potomac, just below the junction of the Sheuandoah River, and at the U. S. Rifle Armory on the latter stream.

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*Melania Virginica*, *Gmelin*, sp.—The whorls well rounded, and entire to the apex. Frequently smooth, but the carinated varieties more abundant; (*M. multilincata* Say); on these, the carinæ, varying from three or four to eighteen on the body whorl, are raised and sharp, and on the more crowded ones, the interstices are densely striated by the longitudinal lines of growth. All the specimens are distinctly banded with brown. Length reaching 1.5 inches.

*Leptoxis isogona*, *Say*. Three specimens found.

*L. dentata*, *Couthouy*. Very numerous. Epidermis generally a rather brilliant green. Transverse brown bands, two near the base, and one near the suture.

*L. nigrescens*, *Conrad*. Numerous. Inhabiting with *L. dentata*.

*L. carinata*, *De Kay*. Very abundant. The carina is prominent and sharp, giving the shell a trochiform appearance. Color light horn, with faint revolving brown bands.

#### RISSOIDÆ.

*Amnicola limosa*, *Say*. Exceedingly abundant.

#### VIVIPARIDÆ.

*Vivipara decisa*, *Say*. Rare. Epidermis distinctly striate, with impressed spiral lines.

#### VALVATIDÆ.

*Valvata tricarinata*, *Say*. Very numerous, but not so much so as the variety *bicarinata*, *Lea*. A few specimens of the smooth variety *simplex* were gathered. None of the individuals collected had attained more than one-eighth inch diameter.

#### HELICIDÆ.

The towering wooded hills on the south side of the Potomac and Shenandoah, are thickly inhabited by Pulmonates. Every projecting rock which arrests the downward course of the mountain torrents, has gathered around its base numbers of dead shells, which are found in all stages of preservation. In some places, where well protected, these shells actually lay in heaps. In a decayed log by the water side, nearly one hundred specimens of *Helix* and *Pupa* were obtained. A close search on the hills on the north side of the Potomac failed to discover a single species of *Helix* or *Pupa*.

*Helix albolaris*, *Say*. Diameter 1.25 inch. Spire rather depressed, and aperture sub-triangular. Reflected lip very broad and flat, with a tendency to form a tooth-like lamina near the umbilical region. Striæ coarse and crowded.

*H. thyroides*, *Say*. A few specimens obtained.

*H. monodon*, *Rackett*. This species appears to be rare at Harper's Ferry. I found but one individual.

*H. hirsuta*, *Say*. Common. All that were collected are entirely destitute of the hairy epidermis. There is considerable difference in the convexity of the upper surface, the spire being sometimes rather depressed.

*H. concava*, *Say*. Dr. Binney, in his "Terrestrial Mollusks," states that the upper and lower extremities of the lip are united in this species by a thin callus on the columella. In the single specimen found by me, the callus is very prominent.

*H. profunda*, *Say*. Numerous. Attaining quite a large size, and with close, narrow, raised striæ. But one brown revolving band is visible.

*H. pulchella*, *Müller*. Rare.

1861.]

*H. tridentata*, Say. In many of the specimens collected, the spire is scarcely at all elevated, and in one or two the upper surface is quite plane. Very common.

*H. labyrinthica*, Say.

*H. chersina*, Say. I discovered a very large number of *H. chersina* and *labyrinthica* in the old log previously alluded to.

*H. lineata*, Say.

*H. arborea*, Say.

*H. indentata*, Say.

Pupa *armifera*, Say. Exceedingly abundant.

*P. contracta*, Say. Three specimens obtained.

*Bulimus marginatus*, Say. Very numerous. The reflected lip is larger in proportion than in Philadelphia specimens.

No specimens of *Succinea* were obtained.

#### LIMNÆIDÆ.

*Limnæa decidiosa*, Say. I found some hundred; of this species on the rocks at the junction of the Potomac and Shenandoah Rivers.

*L. columella*, Say. Rather abundant. Specimens small size.

*L. catascopium*, Say. Rare. Three or four obtained.

*Physa heterostropha*, Say. One specimen.

*Planorbis lentus*, Say. One specimen found.

*P. trivolvis*, Say. Numerous, but not attaining a large size.

*P. bicarinatus*, Say. Very abundant; much more so than the preceding species. The carinæ, as in all the other fresh water mollusca from this locality, are very prominent and sharp.

*P. parvus*, Say. A few individuals were procured.

*P. exacutus*, Say. Rare. Five or six only were found.

*Anelys rivularis*, Say. One specimen only, obtained from *V. decisa*, to the body whorl of which it was attached.

#### CONCHIFERA.

##### CYRENIDÆ.

*Sphærium sulcatum*, Lam. A very few specimens were found; the rocky bed of the river being probably unfavorable to the multiplication of bivalve shells. Those obtained possessed the same rugose epidermis which seems to distinguish all the shells from this locality.

##### UNIONIDÆ.

*Unio cariosus*, Say. This species attains a large size in the Potomac River; the individuals are not numerous, however, at Harper's Ferry. The paucity of the Unionidæ is remarkable in a region where the Gasteropoda, both terrestrial and fluviatile, are so abundant.

*U. complanatus*, Solander, (species.) Valves very thin and shallow, with the epidermis growing beyond their margins. The surface brilliant green in the young shell, and brown in the adult. Not one specimen in ten exhibits any green rays, even in young specimens.

*U. Fisherianus*, Lea. Several good specimens taken.

*U. nasutus*, Say. This species, like *U. complanatus*, very seldom exhibits a rayed surface.

*U. ochraceus*, Say. A single individual obtained.

*U. radiatus*, Lam. Beautiful specimens occur on the Potomac, with a light green polished epidermis, with broad dark rays, and frequently pencilled rays in the intermediate spaces.

*Margaritana undulata*, Say. (Sp.) Very rare. Nacre delicate pink, epidermis in adult shells jet black, much eroded at the beaks.

*M. marginata*, Say. (Sp.) I collected a number of specimens. They were all of small size. Epidermis in the young shells elegantly rayed.

*Anodonta fluviatilis*, Dillwyn. (Sp.) A few individuals were taken; their surface is almost a uniform dull brown, vastly inferior in beauty to those from the vicinity of Philadelphia.

*A. implicata*, Say. One specimen.

*A. edentula*, Say. One perfect young shell, and several larger odd valves were taken; they exhibit the same uniformity of color as *A. fluviatilis*.

The above shells were all collected within the space of two hours, such was their great abundance. A more prolonged search would doubtless add a few more species to the list, particularly among the smaller terrestrial shells. The Molluscan fauna of Harper's Ferry is distinguished for the development of heavy lines of growth and acute prominent carinæ on the shells of the species; and in the terrestrial shells, by the depression of the spire. It is strange that a climate which has evidently exercised some influence on the growth of the Mollusca, has still permitted a vast multiplication of individuals.

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On *SQUALUS AMERICANUS*, Mitchell, referring it to the Genus  
*ODONTASPIS*, Agassiz.

BY CHAS. CONRAD ABBOTT.

In his "Report in part of the Fishes of New York," Dr. S. L. Mitchill makes mention of a species of shark, under the title of *Squalus Americanus*, with the suggestive note, "Caught almost every summer at the very wharves of New York, ten or more feet long."

Again, nearly a year afterwards, (Dec. 8th, 1814,) in the Trans. of the Lit. and Phil. Soc. of New York, vol. 1, p. 483, he mentions and partially describes, under the same name, this species, as follows:—

"*Squalus Americanus*. Long-toothed Shark. With oblong sharp teeth, each of which has a little one on each side, at its base.

This fish is occasionally taken at the very city of New York. He, when he comes, frequents a certain place near the great market, on account of the dead fish and offal thrown into the water there. When the people see one of these sharks prowling about, they bait a hook with a piece of meat or a fish, and not unfrequently catch him.

The teeth of this species are found abundantly in the alluvial country of North America. They are particularly met with in digging wells near the Potomac and James Rivers. On the former, they are found as high as Alexandria; and on the latter, in the city of Richmond itself. The long, sharp, narrow tooth, almost resembling a horse-shoe nail, with its two little auxiliaries, is very plain and characteristic. This I know, by comparing the fossil Virginian species in my possession with those in the jaws of sharks taken at New York.

The mouth of one that was killed during the summer of 1813, was nearer the snout than in many other species. Both jaws had five rows of teeth in front. They were nearly an inch long and not jagged at the sides. Some of them have the rudiments of little teeth on each side, at the base."

For a third time, in the American Monthly Magazine, vol. 2, p. 328, Dr. Mitchell somewhat describes it, proposing for the species the specific appellation 1861.]

tion "*macrodus*" as a substitute for "*Americanus*;" but the former quoted description is sufficient to determine positively the intended species, and having three years priority, the specific name must be retained.

The article in the *American Monthly Magazine* we have not been able to examine.

In the Museum of the Academy, there is preserved a specimen, mounted, and somewhat distorted; and a set of jaws, belonging to the same species, which, if it were not for the descriptions of Mitchill, would be considered non-descript; as the specimens present certain characteristics of dentition not exhibited by any heretofore well defined species of our coast, although in perfect correspondence with the dentition of *Odontaspis taurus*, *O. ferox*, and *Lamna cornubica*; but as none of the above mentioned three sharks are known to be inhabitants of our coast, and as *Eugomphodus griseus*, to which the description of Mitchill might be possibly referred, differs in the dentition from *Odontaspis Americanus*, by the dentulures being vaguely defined prominences instead of sharply defined basal teeth, which is emphatically dwelt upon by Mitchill, it is evident that the *Squalus Americanus*, Mitchill, is the species that is described in detail in this paper, and which, belonging to the genus *Odontaspis*, Agassiz, will hereafter be so referred.

In the "Recherches sur les Poissons fossiles," tome 3d, p. 287, Professor Agassiz established a sub-genus from *Lamna*, Cuv., under the title *Odontaspis*, for the reception of two species, *Odontaspis taurus* and *O. ferox*. This sub-genus he characterized as follows:—

Les dents de *Lamna* sont plates et se rapprochent par leur forme des dents d'*Otodus*; dont elles different cependant par leur moindre largeur et par leurs cones lateraux beaucoup plus petites. Les dents d'*Odontaspis*, au contraire, sont plus cylindriques, plus tordues, et ont des cones lateraux plus long et plus pointus.

Müller and Henlè\* have raised the sub-genus, framed by Agassiz, to the rank of a genus, giving as its characters,

Ouvertures branchiales grandes, toutes situées en avant des pectorales. Eventes très petites. Second dorsale et anale grandes. Lobe superior de la caudale allongé comme dans les carcharias. Fossette caudale indistinct ou manquant complètement. Les carenes de la queue des Lamnies manquent. †

The specimen in the Academy's Museum, to which we consider the descriptions of Mitchill applicable and belonging, is included in the scope of the above generic diagnoses; and the affinities of the specimen are as inclusively comprehended in the enumerations of the characters of *Odontaspis*, in this, the third species of the genus, as its specific variances are distinctly exhibited, from either *O. taurus* or *O. ferox*.

#### ODONTASPIS AMERICANUS, Abb.

*Squalus Americanus*, Mitch. Rep. in part of Fishes of New York, p. 27.

*Squalus Americanus*, Mitch. Trans. Phil. and Lit. Soc. of N. Y. p. 488.

*Squalus macrodus*, Mitch. Amer. Month. Mag. vol. 2, p. 328.

*Squalus Americanus*, De Kay, Fishes of New York, p. 366.

*Squalus Americanus*, Storer, Synop. Fishes of North America, p.

*Squalus Americanus*, Gill. Cat. Fishes of East Coast of N. Amer. in Proc. Acad. N. S., Philad. 1861, p. 60.

Head broader and blunter than in *Odontaspis taurus*. The extremity of the snout approximates to three times as far in advance of the anterior margin of the orbit, as the posterior margin of the orbit is anterior to the angle of the mouth. The nostrils are situated well forward and near the extremity of the

\* System. Besch. der Plagiostomen.

† Recher. sur les Pois. foss., tome 3, p. 287.—Foot note.

upper jaw. The margin of the upper jaw is somewhat distinctly defined, but not as prominently as in *Odontaspis taurus*, according to the figure given by Müller and Henle. The pointed, protruding snout resembles in outline, but is much less prominent than in *Eugomphodus griseus*, which is the nearest allied species found on our coast.

A ready point of difference with which to distinguish the *Odontaspis Americanus* from *Eugomphodus griseus*, is the position of the second dorsal, which in the former, is anterior to, and in the latter, posterior to the anal fin.

Teeth, with a single toothlet on either side, but *one* occasionally wanting.

The first tooth in the upper and lower jaws, smaller than the adjoining teeth; then follow, in the upper jaw, on each side, two very long teeth; at either side of these, another pair of somewhat smaller teeth; then two teeth increase somewhat in length, then the remainder gradually decrease.

In the under jaw from the first pair, the teeth decrease gradually.

The fins generally are similar to those of *Odontaspis taurus*, except the caudal fin, which is very much shorter and broader.

The posterior margin of the first dorsal in *Odontaspis taurus*, the nearest allied species, is posterior to the anterior margin of the ventrals, but in *Odontaspis Americanus*, the first dorsal is in advance of the ventrals, a distance equal to about half the length of the base of the first dorsal. The same difference exists with reference to the second dorsal and anal, with this species and *Odontaspis taurus*.

The head and body, the former especially, are somewhat shrunken and distorted by the mounting—but the measurements will be found nearly correct. Those measurements unattainable are marked *approximating*.

Total length.....	105 inches.
Tip of snout to nostril, approximating.....	5 "
Nostril to mouth, approximating .....	3 $\frac{1}{2}$ "
Mouth to anus, approximating .....	60 "
Anus to anal fin, approximating.....	12 "
Base of anal fin .....	5 $\frac{1}{2}$ "
Anterior margin of anal fin.....	5 $\frac{3}{4}$ "
Anal to caudal fin.....	3 $\frac{3}{4}$ "
Length of caudal fin, ant. inser. to extremity.....	22 "
Anterior margin of under flap of caudal.....	8 $\frac{1}{4}$ "
From pectoral to ventral.....	25 $\frac{1}{4}$ "
Post. bord. of pec. to ant. bord. of first dorsal.....	25 "
Base of first dorsal.....	7 $\frac{1}{2}$ "
Anterior margin of first dorsal.....	8 "
Post. margin of first dorsal to ant. margin of ventrals.....	11 $\frac{3}{8}$ "
Base of second dorsal.....	5 $\frac{7}{8}$ "
Anterior margin of second dorsal.....	7 "
Base of ventrals.....	8 $\frac{1}{2}$ "
Anterior margin of ventrals.....	6 $\frac{3}{4}$ "
Distance between nostrils, approximating.....	3 "
Width of mouth, angle to angle.....	9 $\frac{3}{4}$ "
Margin of upper jaw.....	17 $\frac{1}{8}$ "
Margin of lower jaw.....	13 "

The specimen described was taken off "Beesley's Point," coast of New Jersey, by Messrs. R. Stites, S. Ashmead and Dr. Leidy.

According to Dr. Mitchill, this shark was at one time, one of the most abundant species, but at present, judging from the fact of the species remaining so long undetermined, it must be a rare representative of the *Squalidæ* on the Eastern Coast of North America.

## Monograph of the Species of SPHÆRIUM of North and South America.

BY TEMPLE PRIME.

The genus Sphærium was characterized under its present name by Scopoli, in 1777; since that time, however, it has received various denominations, and the one under which it has been most generally known, that of *Cyclas*, was applied to it in 1792 by Brugière. Mr. Gray revived the term of Sphærium in 1847, and his example has been followed by the conchologists of the continent of Europe. I was the first in this country to discard the name of *Cyclas* for that of Sphærium.

The species composing this genus are small bivalves inhabiting rivers, lakes, streams, and still waters; they are plentifully distributed all over the globe, but as far as present experience goes, seem to be more abundant on the northern portion of this hemisphere than elsewhere.

The shell is transversely oval, nearly equilateral, thin, fragile, sometimes translucent, with beaks more or less raised; its entire surface is transversely striated and covered with a light epidermis varying in color; the margins are rounded, obtuse or angular. The interior of the valves is smooth and varies in color; the muscular impressions are not very distinct; the posterior one is slightly the largest; the palléal impression is parallel with the basal margin; it is narrow and always simple. The hinge margin is very variable; it is usually composed of two small teeth in each valve; at times, however, they are single in one and double in the other, or else single in both valves; these teeth are occasionally rudimentary, or even nearly obsolete. The lateral teeth placed on each side of the cardinal teeth are double in the right valve and single in the left one; the anterior lateral tooth is usually the shorter. The ligament is external; it is short, not very conspicuous, and is always found on the longer portion of the shell.

The animal of Sphærium has a broad foot, capable of considerable extension; it uses it either to bore holes in the mud, in which it sinks the posterior portion of the shell, or as means of locomotion. The syphonal tube is double and very retractile; it is often white like the foot but at times it is colored.

The habits of these molluscs are very similar to those of *Pisidium*, with which they are often found living. The species of Sphærium are less abundant in individuals than those of *Pisidium*; they are also less generally distributed, and are more confined to certain localities than the latter.

## Fam. CYCLADES Fer.

## SPHÆRIUM Scopoli.

*Pectunculus*, Lister, 1685. *Musculus*, Gault, 1742. *Tellina*, Linn., 1758. *Sphærium*, Scop., 1777. *Cardium*, Da Costa, 1778. *Cyclas*, Brug., 1782. *Nux*, Humpfr., 1797. *Musculium*, Link, 1807. *Cornca*, *Pisum*, Megerle, 1811. *Corneocyclas*, Fer., 1818. *Amesoda*, Rafin., 1820. *Pisidium*, Verany, 1846. *Cycladites*, Krug, 1848.

*Generic characters.* Animal oval, lobes of the mantle simple, united posteriorly, and terminating in two short syphons, joined at their base, without tentacles; mouth oval shaped, small; tentacles of the mouth short and narrow; gills rather broad, nearly equal, united behind the foot; foot narrow, elongated.

Shell oval, nearly equilateral; beaks somewhat inflated and prominent; hinge margin narrow, with two primary teeth in each valve; lateral teeth elongated; palléal impression simple; ligament external, narrow, situated on the longer portion of the shell.

[Dec.

*Description of species.\**

a.—Species with rounded but not protuberant beaks.

1. *Sph. sulcatum*, Lam.

*Cyclas sulcata*, Lam., An. s. vert. v. 560, 1818.

*C. Saratogea*, Lam., loc. sub. cit. v. 560, 1818.

*C. similis*, Say, Nich. Encycl. Amer. edit. ix. pl. 1, fig. 9, 1818.

*C. lasmampsis*, Rafin., Il. scie. Phys. ix. 319, pl. 82, f. 19, 20, 1820.

*C. solida*, DeKay, Rept. 220, pl. xxv. f. 265, 1842.

*C. gigantea*, Prime, Bost. Proc. iv. 157, 1851.

*C. ponderosa*, Prime, loc. sub. cit. iv. 157, 1851.

*C. striatina*, Lam., Fer. in Mag. Zool., 1835.

*C. rhomboidea*, Say, C. B. Adams, Vermont cat. 18, 1842.

Animal white, tubes a light orange color.

Shell transversely oval, nearly equilateral, light in texture for its size; posterior margin somewhat more pointed; anterior rounded, base slightly curved; valves convex; beaks full, raised above the outline of the shell; posterior portion a little longer; sulcations coarse, regular; epidermis dark chestnut brown; interior light blue; hinge margin narrow, nearly a straight line; cardinal teeth small, indistinct, situated somewhat towards the anterior side, double in both valves, and so placed as to assume the shape of the letter V reversed; lateral teeth on a line with the primary teeth, large, strong and prominent.

The young is more equilateral than the adult; more compressed; it presents the shape of a quadrilateral, it is of a light lemon color, the striations are as heavy as those of the mature shell.

Long. 11-16; lat. 71-61; diam. 5-16 inches.

*Hab.* North America, in the New England States, and in the States of New York, New Jersey, Pennsylvania, Ohio, Michigan, Wisconsin and Alabama.

(Cabinet Acad. of Nat. Sci. of Phila., Garden of Plants in Paris, Mus. Delessert, Jay, Prime and others.)

This, our most common and widely distributed species, living as it does in so many different sections of the country, presents at times great variations in size, color and general appearance. It can, however, be easily recognized by its very elongated and equilateral form, and by the beaks which are uniformly full and convex; they are often eroded. The young is often of a uniform light lemon color, which, as the shell matures, becomes gradually darker from the beaks downwards until the new shade covers the whole surface of shell; in certain intermediate stages of growth, the shell is marked with a zone of yellow on the inferior margin; the color of the adult varies from a greenish brown to a dark chestnut. The young shell has at times, owing to the variations which exist between it and the adult, been taken for a different species; by some it has been taken for the *Sph. rhomboideum*.

The hinge margin is generally straight. I have specimens, however, from Alabama, Pennsylvania and Rhode Island, in which it is slightly curved. One of the distinctive characters of this species is that the lateral teeth are never placed at an angle with the cardinal teeth; they are generally on a straight line with them.

The finest specimens I have seen of the *Sph. sulcatum* were sent to me by Mr. Ingalls, who had collected them in Washington Co., N. Y.; they were remarkably convex, and measured as much in length as 13-16ths of an inch; the beaks were very full, and much raised above the margin of the shell.

This species was first described in 1818, by Lamarck, under the names of *Cy-*

\* I am preparing for publication, as a complement to this Monograph, an Atlas with colored figures of the different species described.

clas sulcata and Cyclas Saratoga. Say, in 1819, ignorant that this shell was known to conchologists, described it as the Cyclas similis, under which name, until very recently, it has been most generally known. Say also figured this species, but his figure, I regret to say, is not correct, and would be more apt to give one the idea of a Pisidium than of a Sphaerium. The description by Say of the Cyclas similis applies perfectly to the shell under consideration, of which Dr. Gould has given a very good figure in his Report on the Invertebrata of Massachusetts.

As related elsewhere,\* I had an opportunity, some years since, while in Paris, to see Lamarck's original specimens of the Cyclas sulcata and Saratoga, at the Garden of Plants, and at the Delessert Museum; and to convince myself by examination that they both belonged to one species, and were identical with Say's Cyclas similis.

2. Sph. aureum, Prime.

*Cyclas aurea*, Prime, Boston Proc. iv. 159, 1851.

Animal, not observed.

Shell transversely oval, slightly elongated, nearly equilateral, heavy, convex; beaks full, raised above the outline of the shell; anterior margin broad and rounded; posterior narrower and somewhat angular; inferior slightly curved; hinge margin somewhat broad, curved; cardinal teeth diminutive, double, so placed together as to represent the form of the letter V reversed, and rather wide-spread; lateral teeth situated each one at an angle with the cardinal teeth, strong and large; sulcations deep, not very regular; epidermis varying from a greenish yellow to a bright gold color, slightly lustrous; interior of the valves bluish white.

Long. 9-16; lat. 7-16; diam. 6-16 inches.

*Hab.* North America, from Lake Superior?

(Cabinet. Agassiz and Prime.)

This is one of our most attractive species, but also one of the rarest. It is supposed to have been brought from Lake Superior by the expedition which visited that region under Professor Agassiz. In general outline it offers some similarities with the Sph. sulcatum; it is, however, a much more ponderous shell; it is less elongated, more convex, its sulcations are not so regular, its color is different, and lastly, its hinge margin is much more curved.

Compared to the Sph. solidulum, it is more convex, more elongated, its posterior margin is broader, the hinge margin is not so much curved, the beaks are fuller, and the sulcations are not quite so heavy; the color is also different.

3. Sph. solidulum, Prime.

*Cyclas solidula*, Prime, Bost. Proc. iv. 158, 1851.

*C. distorta*, Prime, loc. sub. cit. iv. 158, 1851.

Animal, not observed.

Shell transversely inequilateral, elongated, slightly convex; beaks full, not very prominent; anterior margin rounded; posterior drawn out to an angle; base slightly curved; epidermis variable, dark chestnut or brownish yellow, with sometimes a yellow zone on the basal margin; sulcations coarse, irregular; interior dark blue; hinge margin considerably curved; cardinal teeth double, in the shape of the letter V reversed; lateral teeth large; the anterior placed at an angle with the margin; the posterior more on a continuation of the curve.

Long. 9-16; lat. 7-16; diam. 5-16 inches.

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\* Notes on some American species of Cyclas, etc., by Temple Prime. The Hague. 1857. 8vo.



*Hab.* North America, in the States of New York, New Jersey, Ohio, Maryland, Virginia and Indiana.

(Cabinets Academy of Nat. Sci. of Phila., Jay et Prime.)

This species which is not uncommon was probably confounded by our early conchologists with the *Sph. sulcatum*, it differs from that shell, however, in being less elongated, more inequilateral, less convex, the hinge margin is more curved, and the shell is more solid.

4. *Sph. striatinum*, Lam.

*Cyclas striatina*, Lam., An. s. vert., v. 560, 1818.

*C. edentula*, Say, N. Harm. Dissem. 2, 1829.

*C. cornea*, Lam., C. B. Adam's Cat., 1847.

*C. albula*, Prime, Bost. Proc. iv. 155, 1851.

*C. tenuistriata*, " loc. sub. cit., iv. 156, 1851.

*C. acuminata*, " " " iv. 158, 1851.

*C. inornata*, " " " iv. 159, 1851.

*C. simplex*, " " " iv. 159, 1851.

*C. modesta*, " " " iv. 159, 1851.

Animal white, tubes light reddish yellow.

Shell slight, transversely elongated, somewhat compressed, inequilateral; anterior margin rounded, posterior distended, inferior rounded; beaks full, not much raised; sulcations irregular, at times so light as hardly to be seen with the naked eye, thus giving the shell a lustrous appearance; color varying from a light greenish yellow to a darker shade; valves slight; interior blue; hinge margin slightly curved; cardinal teeth double, very small, of the same size; lateral teeth larger, not very prominent.

Long. 7-16; lat. 5-16; diam. 4-16 inches.

*Hab.* North America, in the States of New York, Connecticut, Pennsylvania, Michigan, Illinois, Ohio, Alabama, Tennessee, and in the Hell Gate river, Washington Territory.

(Cabinet. Academy of Nat. Sci. Phila., Jay, Prime and others.)

As may be seen by the above synonymy, I have been induced to unite under this species several which I described as distinct in 1851. The differences existing between these shells are at times quite marked, but in general characters they agree, and I am inclined to believe that these differences owe their origin solely to local causes.

I had occasion some time since to convince myself of the identity of the *Sph. striatinum* with the *Cyclas edentula* of Say.\*

This species, which is not un plentiful in the localities where it is found, varies much in size, color and external appearance generally. The shell from Connecticut is so slight, that it is nearly translucent, and the striae are so light as to impart to it a lustrous appearance; on the other hand, I have specimens from the Hoosack, which are quite heavy and coarsely striated; in the main, however, they all seem to tally. The variety from Alabama, described as the *Cyclas tenuistriata*, is less distended, is fuller, and the sulcations are hardly perceptible.

Compared to the *Sph. solidulum*, this species is smaller, more inequilateral, less tumid, more compressed, less solid, less heavily sulcated, and its posterior extremity is more distended.

5. *Sph. stamineum*, Conrad.

*Cyclas staminea*, Conrad, Amer. Journ. xxv. 342, pl. 1, f. v. 1834.

*C. fuscat*, Rafin., Prime in Bost. Proc. iv. 281, 1852.

*C. bulbos*, Anthony, Prime in loc. sub. cit., iv. 283, 1852.

Animal, not observed.

\* Notes on some American species of *Cyclas*, etc., by Temple Prime. The Hague, 1857. 8vo.

Shell oval, somewhat full, inequilateral; anterior generally abrupt; posterior slightly distended; beaks very full and prominent, widely separate at the apex, often eroded; epidermis dark brownish yellow; striae heavy; valves strong; interior blue; hinge margin curved; cardinal teeth double, nearly obsolete; lateral teeth distinct, strong.

Long. 9-16; lat. 6-16; diam. 5-16 inches.

*Hab.* North America in the States of New Jersey, Ohio, Illinois, Arkansas and Alabama.

(Cabinet. Academy of Nat. Sci. of Phila., Conrad, Jay and Prime.)

I have been induced to unite to this species the *Cyclas fuscata*, Rafinesque, which I consider as nothing more than a large variety. The *Cyclas bulbosa*, Anthony, is a little more globose than Mr. Conrad's typical specimens, but presents no important characters of difference. The shells of this species found in New Jersey and in Illinois, are larger than those from Alabama.

This species differs from most of our North American ones by its full and very prominent beaks.

6. *Sph. rhomboideum*, Say.

*Cyclas rhomboidea*, Say, Acad. Nat. Sci. Phil., II. 2, 380, 1822.

*C. cornua*, var. 3. Lam., An. s. vert. v. 558, 1818.

*C. elegans*, C. B. Adams, Bost. II. 3, 330, pl. 3, f. 11, 1840.

Animal, syphons reddish yellow.

Shell subglobular, rhombic-orbicular, equilateral; anterior margin truncated; posterior slightly angular; basal nearly straight; beaks full, but not prominent; valves slight, convex towards the beaks, gradually decreasing in fulness towards the margins; interior blue; sulcations very delicate; epidermis olive green, with often a straw-colored zone on the margins; young shell more compressed than the adult; hinge margin nearly straight; cardinal teeth rudimentary; lateral teeth distinct, somewhat acute, not elongated.

Long. 8-16; lat. 6-16; diam. 5-16 inches.

*Hab.* North America, in the States of Vermont, Connecticut, Massachusetts, New York and Ohio.

(Cabinet. Academy of Nat. Sci. Phila., Jay, Prime, and others.)

This, the most attractive species of *Sphærium*, is not easily confounded with any other. Up to within a few years it was usually known among collectors under the name of *Cyclas elegans*, Adams. I have stated elsewhere\* my reasons for considering the *Cyclas elegans* as identical with Say's shell. Though no longer rare since 1851, when Mr. Whittemore found it in considerable abundance at one place near Cambridge, Mass., this species does not seem to be very widely distributed; it is confined to certain special localities.

7. *Sph. dentatum*, Hald.

*Cyclas dentata*, Hald., Acad. Nat. Sci. Phila. Proc. i. 100, 1841.

Animal, not observed.

Shell large, ventricose, somewhat equilateral, inferior and anterior margins rounded; posterior somewhat angular; beaks large, well rounded, distant, not very prominent; hinge margin nearly straight; cardinal teeth single, distinct; lateral teeth not prominent; sulcations slight; epidermis olive green, with a dark narrow zone at some distance above the basal margin.

Long. 1-2; lat. 2-5; diam. 3-8 inches.

*Hab.* North America, in Oregon.

(Cabinet. Academy of Nat. Sci. Phila.)

The young shell is more elongated and more heavily sulcated than the

\* Annals of the N. Y. Lyceum, vol. vi. p. 66, 1833,

adult; the beaks are less large and less tumid. This is a well marked species; compared to the *Sph. patella*, Gould, from the same section of the country, it is found to be larger, more ventricose, the beaks are more inflated, and the color of the epidermis is different.

The only two specimens I have seen of the *Sph. detrunctum* were those from which Mr. Haldeman described the species, an adult and a young one, which he was kind enough to lend me for study; they are now deposited in the collection of the Academy of Nat. Sci. of Philadelphia.

8. *Sph. fabalis*, Prime.

*Cyclas fabalis*, Prime, Bost. Proc. iv. 159, 1851.

*C. castanea*, Prime, loc. sub. cit., iv. 160, 1851.

*C. sulculosa*, DeCharpentier, Mss. 1851.

Animal, syphons crimson.

Shell transversely oval, compressed, nearly equilateral; anterior and basal margins rounded; posterior margin slightly abrupt; beaks not full, very much depressed; sulcations moderately heavy, very regular, quite distinct; epidermis light green, it is, however, sometimes quite dark; in the young it is often straw color; valves slight, interior blue; hinge margin very slightly curved; cardinal teeth small, assuming the shape of the letter V reversed; lateral teeth slight; anterior tooth somewhat more elevated, both placed very nearly on a line with the cardinal teeth.

Long. 9-16; lat. 7-16; diam. 4-16 inches.

*Hab.* North America, in the States of New York, Ohio, Illinois, Tennessee, Georgia and Virginia.

(Cabinet. Jay and Prime.)

This is a very distinct species; I know of no other to which it bears any resemblance; it is remarkable for its compressed appearance, and for the depression of its beaks. Though pretty widely distributed, it does not seem to be found any where in much abundance.

The epidermis of the shell is at times so entirely stained with a darkish substance, that it is with difficulty that its color can be detected.

9. *Sph. occidentale*, Prime.

*Cyclas ovalis*, (preoc.,) Prime, Bost. Proc., iv. 276, 1852.

*Sph. ovale*, Stimps. Adams, rec. gen. 2, 450, 1858.

*Sph. occidentale*, Prime, Ac. N. S. Phila., Proc., 295, 1860.

Animal not observed.

Shell oval, small, pellucid, fragile, equilateral, margins rounded; valves slight, rather convex; beaks full, rounded, not much raised; sulcations very fine, hardly visible; epidermis horn color; cardinal teeth very diminutive; lateral teeth more distinct.

Long. 5-16; lat. 4-16; diam. 3-16 inches.

*Hab.* N. America, in the States of New York, Vermont, Ohio, Wisconsin, Georgia and in the Hell Gate River, Washington Territory.

(Cabinets Academy N. S. of Phila., Jay and Prime)

This species is remarkable for its completely oval shape, which renders it quite distinct from all others. It is found not uncommonly. Compared to the *Sph. partium*, under which name it has at times been sent to me, it is much smaller, the margins are more rounded, and the beaks are not so much raised.

10. *Sph. nobile*, Gould.

*Cyclas nobilis*, Gould, Bost. Proc., v. 229, 1855. Atlas of U. S. Explor. Expedit., pl. 36.

Animal not observed.

Shell rhombic-ovate, inequilateral, moderately compressed; anterior margin truncated, posterior more distended, basal curved; beaks rounded, inclined towards the front, slightly tumid, separate at apex; sulcations coarse; epidermis delicate, light brown; valves strong, interior white; hinge margin nearly straight, moderately broad; cardinal teeth single, distinct; lateral teeth moderately developed.

Long. 8-16; lat. 6-16; diam. 4-16 inches.

*Hab.* N. America, at San Pedro in the State of California.

(Cabinet. Gould and Prime.)

Compared to the *Sph. sulcatum* it is slighter, less sulcated, more compressed and less tumid. This species is rare, the only specimens I have seen were kindly presented to me by Dr. Gould.

11. *Sph. patella*, Gould.

*Cyclas patella*, Gould, Bost. Proc., iii. 292, 1850. Atlas U. S. Explor. Expedit., pl. 36.

Animal not observed.

Shell rounded oval, lenticular, compressed, equilateral; margins generally rounded; beaks central, small, hardly raised; valves slight, interior white; sulcations extremely fine; epidermis light, of a yellowish brown color; cardinal teeth very diminutive, so placed as to assume the shape of the letter V reversed; lateral teeth not prominent, elongated.

Long. 7-16; lat. 5-16; diam. 3-16 inches.

*Hab.* N. America, in Oregon.

(Cabinet. Gould and Prime.)

This species is peculiar, owing to its compressed oval shape and rounded beaks; compared to the *Sph. flavum* it is more oval, more equilateral, and its beaks are less tumid. The specimens in my cabinet came from Dr. Gould.

12. *Sph. Vermontanum*, Prime.

Proc. Ac. N. S. Phil. 128, 1861.

Animal not observed.

Shell very oblique, tumid, inequilateral, full; anterior margin abrupt, posterior drawn out to an angle, basal slightly curved; beaks large, full, prominent, placed very much towards the anterior, in which direction they are slightly inclined; sulcations coarse, moderately regular; epidermis light green; ligament conspicuous; valves solid, interior light blue; hinge margin much curved, broad; cardinal teeth strong, representing the letter V reversed; lateral teeth elongated, strong.

Long. 9-16; lat. 6-16; diam. 4-16 inches.

*Hab.* N. America, in Lakes Champlain and Memphramagog, Vermont.

(Cabinet. Prime.)

Remarkable for its very oblique and tumid shape, and for the abruptness of its anterior margin. Compared to the *Sph. stamineum*, it is more tumid and less heavily sulcated; it is less elongated and more tumid than the *Sph. striatum*. Quite rare. I have never seen but a few specimens of this species, which were received from the late Prof. Adams, of Amherst.

13. *Sph. emarginatum*, Prime.

*Cyclas emarginata*, Prime, Bost. Proc. iv. 156, 1851.

Animal not observed.

Shell triangular, nearly equilateral, convex, tumid, anterior and posterior margins abrupt, posterior slightly more distended, basal margin curved; valves solid, interior white; beaks very full, prominent, nearly central; ligament distinct; sulcations regular, not heavy; epidermis brown, with several narrow transverse zones of a dark color at regular intervals; hinge margin

curved; cardinal teeth single, quite distinct; lateral teeth not much elongated, strong.

Long. 6-16; lat. 6-16; diam. 4-16 inches.

*Hab.* N. America, in the region of Lake Superior.

(Cabinet. Agassiz and Prime.)

The triangular and very tumid form of this species is quite singular; it differs from the *Sph. Vermontanum* in being more tumid, fuller, in having larger beaks and in being much less broad at the base. The young shell is more elongated and less tumid than the adult. A rare species.

14. *Sph. flavum*, Prime.

*Cyclas flava*, Prime, Bost. Proc., iv. 155, 1851.

Animal not observed.

Shell transversely rounded, compressed, equilateral, delicate, margins generally rounded, the posterior a little distended; beaks central, not full, more or less depressed; valves very slight, interior whitish; sulcations pretty deep, regular; epidermis light, of a greenish yellow color; cardinal teeth small, in the shape of the letter V reversed; lateral teeth elongated.

Long. 7-16; lat. 5-16; diam. 3-16 inches.

*Hab.* N. America, at the Sault St. Marie, Lake Superior.

(Cabinet. Agassiz, Jay and Prime.)

This is a very slight and delicate species, quite distinct from any others but the *Sph. patella*, to which it bears some general resemblance from its shape; it is, however, more compressed, less high, and the exterior of the valves is very different, as they are nearly smooth in Dr. Gould's shell. Found not un plentifully in the one locality.

(To be continued.)

Descriptions of New Palaeozoic Fossils from Kentucky and Indiana.

BY SIDNEY S. LYON.

ECHINODERMATA.

CRINOIDEA.

Genus CYATHOCRINUS Miller, 1821.

CYATHOCRINUS LEVICULUS, n. s. Plate iv., fig. 1.

Calyx subconical, truncate at its junction with the column, from which it expands upward. The pieces composing the calyx are smooth, united in a distinct groove. Basal pieces 5, pentangular, equal in size, slightly concave at the junction with the column. Subradials 5, four of which are of the same size, hexagonal in form, the fifth is a little larger than the others; it is truncated at its summit, thus receiving an additional side. Radial pieces 5, similar in form, septagonal, grooved on their upper margin at their junction with the second primary radial pieces. These being absent in our specimen, their form is unknown. One anal piece is present, it is small, resting upon the right oblique upper margin of the largest piece forming the first circle above the basal pieces. One or more have fallen out, the space is quadrangular, a little higher than wide, having the same width and placed immediately above the truncated summit of the largest piece forming the subradial circle. Columnar facet large, opening large and nearly round.

*Dimensions.*

Height of calyx, from column to summit of first radials, .19-100 inch.

Diameter of base at its junction with column..... .16-100 "

Diameter of calyx at summit of first radials ..... .20-100 "

1861.]

*Locality and geological position.* Collected by Dr. J. Knapp, from the crinoid bed, lying between the Hydraulic limestone and the Black-slate, Beargrass quarries, Jefferson county, Kentucky.

I am indebted to Dr. J. Knapp, of Louisville, Kentucky, for the use of this and several other species from the same localities.

Our species is evidently not an adult; no analogous adult form has been collected from these beds.

CYATHOCRINUS WORTHENI, n. s. Plate iv., fig. 2.

The fragmentary condition of our specimen prevents a complete description.

Calyx subconical, about as wide as high, expanding upward, composed of pieces ornamented by carina intersecting each other at the centre of the pieces; dividing the surface into triangular spaces deeply depressed at the centre of each, except the basal pieces; upon these the carina passes from the centre of the subradials downward and along the lateral margins and base of the basal pieces at the line of their union with the column. Basal pieces nearly as high as wide, pentangular, the lateral margins half as high as the width of the base of the pieces. Subradials septagonal, nearly the same size, alternating with the basal pieces. Radial pieces considerably less than the subradials. A fragment of one of second primary radials is present; it is somewhat oval, the inner side is grooved by a deep furrow; the body of the piece is perforated by a round opening. The column is composed of thin pieces having ten prominent thickened projections, making when joined a circular column deeply indented by ten longitudinal grooves, one under the centre and one under the lateral union of the basal pieces. Columnar opening obscurely pentapetalous.

*Dimensions.*

Height to summit of first primary radials.....	52-100 inch.
Diameter of base at column.....	28-100 "
Diameter at summit of first radials .....	65-100 "

Our example is slightly crushed.

*Geological position and locality.* Collected by Dr. J. Knapp, from the same locality and same beds as the preceding species; like that species, it is rare.

Genus ACTINOCRINUS Miller, 1821.

ACTINOCRINUS CASSEDAYI, n. s. Plate iv., fig. 3-3a.

Calyx basin-shaped, twice as wide as high, composed of thick costate pieces, the costa being partially or entirely interrupted at the sutures, marking the union of the pieces. The basal pieces are low, widely expanded beyond the column and body, deeply concave below, the outer margin of the pieces alternately raised and depressed, presents a waving line. The summit is low, covered by small prominent pieces, the central pieces being the largest; a double row of pieces not quite so large as the central ones, radiate from the central pieces to the centre of each group of arms; the spaces between these rows are deeply depressed, and are covered by very small pieces. All the pieces covering the summit are irregularly and prominently granulated. The central pieces are absent. It is probable the summit was surmounted by a proboscis, which is subcentral. Near the proboscis (?) are two lip-shaped pieces slightly parted, leaving an opening into the calyx. The interspaces between the costa on the radial and interrarial pieces are remarkably deep and irregular in form. The radial pieces rise directly on the basal pieces. The interrarial pieces appear to be three in each space. Anal pieces, from eight to ten. Column round and small, being less than half the diameter of

the basal pieces. Opening small and irregularly circular. The arms appear to consist of groups of four each; the postero-lateral groups are not seen; their number is unknown.

*Dimensions.*

Height from base to arms.....	.....	·22-100 inch.
Height from base to summit.....	.....	·35-100 “
Greatest diameter.....	.....	·75-100 “
Least diameter.....	.....	·50-100 “
Diameter of base.....	.....	·35-100 “
Height of base.....	.....	·05-100 “

*Geological position and locality.* Collected by Dr. J. Knapp, in the same beds as the preceding species.

I have dedicated this elegant crinoid to the memory of one who loved and cultivated geology, my lamented friend, the late S. A. Casseday, of Louisville, Kentucky.

ACTINOCRINUS MEEKI\* n. s. Plate iv., 4 a-b.

Calyx uniform, symmetrical, a little wider than high; a prominent ridge rises at its junction with the column, slight at first, gradually increasing in size as it passes over the body along the line of the centre of the rays to the summit of the third radial pieces, the whole surface of the body is elaborately ornamented by fine raised ridges slightly waving; sometimes two are found uniting together, especially at the external corners of the triangular figures which they form; the centre of the triangle resting on the angular notch marking the union of any three adjacent pieces, the external points of the triangles terminating at the centre of the pieces, except in the basal pieces, when the lower point of the triangular figure terminates near the base of the pieces at the column. Basal pieces three, forming a broad deep pentagonal cup, the upper margins of which are slightly concave. First primary radials very large, hexagonal; the upper margin divided into three nearly equal sides, the centre of which supports a small quadrangular second primary radial, the centre line of which is rendered very prominent by the carina marking the line of the rays: this bears a nonagonal axillary third radial, still more prominent than those below. A single complete interradiated field is exhibited in our specimen; it consists of one large octagonal piece, supporting two small parallelogramic pieces; the lateral oblique margins of the third primary radials also rest upon it. The form of the arms are unknown; they appear to start in groups of two each, ten in all. Column very small, round, arrangement unknown. Columnar facet concave, crenulations not visible, perforation very small and round.

*Dimensions.*

Height of calyx.....	.....	·33-100 inch.
Height of first primary radial.....	.....	·37-100 “
Whole height from base to summit of third radials.....	.....	·85-100 “
Diameter at centre of first radials.....	.....	·80-100 “
Diameter at summit of third radials.....	.....	1·00-100 “

*Geological position and locality.* Collected by Dr. J. Knapp, in beds from 70 to 75 feet below the black slate, Jefferson county, Kentucky, where it is found associated with *Caryocrinus*, *Eucaleptocrinus*, *Melocrinitis*, &c. The beds for several feet above and below are barren of fossils. Pentamerus oblongus are quite abundant in beds from twenty to twenty-five feet above.

\*I take pleasure in specifically designating this new and elegant crinoid by the name of Meeki, in honor of F. B. Meek of the Geological Survey of Illinois.

## Genus RHODOCRINUS Miller, 1821.

## RHODOCRINUS HALLI, n. s. Plate iv., fig. 5 a-b.

Body vasiform, one-third wider than high, composed of slightly convex and plane pieces, connected by distinct depressed sutures. The lines of the rays are prominent, while the interradial fields between them are nearly level, giving the calyx a pentagonal figure at the summit of the second radials. Columnar facet large, covering nearly the whole of the basal pieces, the angular points alone project beyond the column. Basal pieces five, short, lanceolate, crenulated and concave at their union with the column. Subradial pieces five, convex, three are pentagonal, the summits of the other two are truncated and hexagonal; one truncated piece supports the anal field, the other being the second to the left of the anal piece. A slight elevation rises at the lower side of the subradials, runs to the centre of them, when it branches; a branch from the subradials on either side uniting at the centre of the first radial piece. The first primary radials two, one septagonal, two hexagonal, the second to the left of anal field being pentagonal; they alternate with the subradials, rising from the angular notch between them, and with the first anal piece from a closed circle around the calyx. The second primary radials are quite small when compared with those below; they differ in size and are all hexagonal. The third primary are axillary, pentagonal, less than the second series; they each support one brachial piece on either of their oblique upper margins; from this last piece appears to rise the free arms. Interradials—the first are large pentagonal, each supporting two smaller pieces; these again support three; the fourth series appears to consist of four pieces. Our specimen does not show the upper part of any interradial field perfectly. The first anal piece is hexagonal; it supports three pieces, the central one pentagonal, the other two hexagonal, these support five (?). Arms ten, column round, perforation small, (obscure on our specimen,) it is nearly round, or slightly pentelobate.

*Dimensions.*

Height of specimen .....	85-100 inch.
Greatest diameter (specimen slightly crushed).....	1-80-108 “
Diameter of base.....	40-100 “

*Geological position and locality.* Collected by Dr. J. Knapp, in the same beds as specimens described in this paper under Nos. 43, 44 and 49. Named in honor of James Hall, Esq., of Albany, N. Y.

## Genus MAGESTOCRINUS Owen &amp; Shumard, 1848.

## MAGESTOCRINUS KNAPPII, n. s. Plate iv., fig. 6 a-b.

Calyx subglobose, base broad, nearly flat to the end of the second primary radials, slightly depressed at the basal pieces. Base composed of three pieces, nearly equal in size, together they present an oblong hexagonal disk. First primary radials hexagonal, nearly equal in size, about as wide as high, upper margins straight and parallel to the base of the pieces, the base a little wider than the summit of the pieces. Second primary radials hexagonal, less than the first radials, each surmounted by a short thick spine, the base of which covers the surface of the piece. Third radials axillary, less than the second, each surmounted by a spine like the second radials; the spines on the different third radials vary in size; they taper more rapidly than the spines on the second radials. Each third radial supports on its upper oblique upper margins two secondary radials, each of which is surmounted by a short obtuse spine, more or less prominent; two or three oblong non-spinous pieces are supported by these, which reach to the free arms. Interradial pieces: the first



is large, hexagonal resting in the angular notch between the first radials, it supports two pieces of the second series, these again three pieces. All the pieces from the base to the summit of the second radials are well defined by a deep groove at the base of their junction with each other; above this the pieces rise upon a surface quite smooth, and are more readily distinguished by the spine marking the centre of each piece, than by the line of their union with each other. The first anal piece is like the first radial pieces, it supports one hexagonal piece on its centre, and a pentagonal piece on each of its oblique upper sides; this group of four pieces are nearly of the same size and are slightly convex; they support about six rows of pieces one above the other, each row diminishing in size and number of each row, in all about twenty-five pieces, each piece having a central spine or tubercle. The summit is low, deeply depressed between the groups of arms, surmounted by a subcentral proboscis, covered by numerous polygonal pieces nearly of the same size, separated by well defined grooves. The arms appear to be ten in number, the postero-lateral rays are not seen; it is possible they may bear three each; should this be the case, the whole number of arms would be twelve. The arm facets are large and prominent; a small portion of one of the arms remaining on the specimen, shows them to be composed of a double row of thin pieces.

*Dimensions.*

Height to free arms.....	·48-100 inch.
Height to base of proboscis .....	·85-100 "
Diameter below arms.....	·95-100 "

*Geological position and locality.* Collected by Dr. J. Knapp, from the crinoid bed immediately below the hydraulic limestone, Clark county, Indiana.

I take pleasure in dedicating this species to a cultivator of Geology, my friend, Dr. J. Knapp of Louisville, Ky.

MAGESTOCRINUS SPINOSULUS, n. s. Plate iv., fig. 7 a-b.

Body subcylindrical, expanding slightly from the middle of the third primary radial to the summit of the third secondary radials. The first three or four axillary pieces lying nearly horizontal, expand the body at the insertion of the arms. The base is nearly level to the end of the spines on the third primary radial, concave from the middle of the second radial to the centre of the basal pieces; the summit is low, arched, surmounted by a proboscis placed quite near the side of the summit above the anal side. Basal pieces: together they form nearly a circle, slightly indented at the sutures at which they are united, crenulated on the outer margin of the columnar facet, forming a thin disk, implanted upon the second circle of pieces, a little larger when joined to the body than at the union with the column. The pieces appear to be joined to the second circle by lapping, and not at the edges of the pieces. First primary radials five, hexagonal, nearly equal in size, differing slightly in form, summits nearly parallel to the base of the pieces, curving outward and downward at the outer extremity of each. Second primary radials hexagonal, the centre of each having a mammillary tubercle more or less prominent. Third radials larger than the second, pentagonal, differing considerably in size and form; the centre of each piece is surmounted by a short mammillary or spinous tubercle, the base of which covers nearly or the entire surface of the pieces, on the upper oblique margins of each rests two hexagonal or septagonal pieces; each of which bears like the third radials a spine or tubercle, which are rather smaller than those on the radial below them, on which they rest. These last pieces are also axillary, and support each two smaller pieces more or less spinous, the last two pieces nearest each other (or in the centre of the several rays,) are also axillary and support each two small pieces, one above the other, the outer pieces supporting three similar pieces, all of which

bear near the centre a small tubercle. The brachial pieces appear to rest upon the last of the preceding series. Interradials: the interradial fields are filled with from seven to nine pieces, the first are of the same size and form as the second radials; they rise from the angular notch between the first radials, and support on their upper margins two spinous pieces like the third radials, with which they form a circle around the base of the vertical sides of the body; in an angular notch between the second range of interradials rests one large spinous piece, this supports two or three nearly smooth pieces one above the other. Interaxillary: rising between two of the first secondary radials are two small pentagonal pieces, one above the other, completely enclosed by the pieces of the secondary radials. Anal pieces: these are about twenty in number, rising in ranges one above the other; these ranges are not quite regular, but are thrust into and interlock each other; the pieces are similar in form and size to the other pieces of the same height composing the calyx. They diminish in size and number in the ranges until the field is terminated by a single piece immediately below the circle of the arms. The arms are thirty in number, in groups of six each; they form a closed circle around the calyx and support the vault. They appear to have been nearly circular, formed of two rows of thin pieces; the opening through the arm facets is circular and covered by the pieces of the summit. The summit is covered by numerous small polygonal pieces differing greatly in size. Near to the margin and immediately above the centre of each group of arms is placed a larger piece which is surmounted by a short spine; all the pieces are well defined by a deep groove at the line of the union of the pieces. The proboscis appears, (judging from two circles of pieces which are attached to our specimen), to have been composed of stout small pieces similar to those forming the summit. The surface markings are nearly all removed from our specimen; one or two pieces of the summit are finely granulose. The epidermis bearing the granula, is about one-thirtieth of an inch thick.

*Dimensions.*

Height from base to free arms.....	.55-100 inch.
Height from base to proboscis .....	1.00-100 “
Greatest diameter of calyx below arms.....	1.25-100 “
Greatest diameter of summit.....	1.60-100 “
Diameter of basal pieces.....	.25-100 “

*Geological position and locality.* Collected from a bed about six feet below the hydraulic limestone, Falls of Ohio, Clark county, Indiana. It is associated with the preceding species. My cabinet and that of Dr. J. Knapp, Louisville, Ky.

**Descriptions of three new species of Mollusca of the genus SPHÆRIUM.**

BY TEMPLE PRIME.

1. *Sphærium meridionale*, Prime.—S. testa ovato-oblonga, compressa, tenui, inæquilaterali, tenui, transversim elegantissime striata; intus carneorubra maculata; umbonibus parum prominentibus, natibus acutis, antice approximatis, inclinatis; epidermide fusco-luteolo, nigro-maculata; latere antico brevi, valde declivi, obtuso, postico subangulato, margine inferiore parum arcuato; dente cardinali minimo, dentibus lateralibus valde compressis, elongatis, antico majore.

Long.  $\frac{1}{3}$ ; lat. 1-5th; diam.  $\frac{1}{8}$  poll.

*Hab.* Panama; (Collect. Prime.)

Compared to the *Sphærium maculatum*, Morelet, of Yucatan, this species differs in having a less abrupt posterior margin, its lateral teeth are larger and more developed, and the shell is generally less inflated.

[Dec.

2. *Sphærium Barbadosense*, Prime.—S. testa ovato-oblonga, ventricosa, inæquilaterali, tenui, transversim striata, intus carneo-rubra maculata, umbonibus prominentibus, natibus acutissimis, inclinatis, erosis; latere antico rotundato, postico latiore, obtuso; epidermi le fusco-luteolo; dentibus cardinalibus inconspicuis, lateralibus parvis, subæqualibus, antico paulo majore.

Long.  $\frac{1}{6}$ ; lat. 1-5th; diam.  $\frac{1}{6}$  poll.

*Hab.* Barbadoes; (Collect. Prime.)

This insular species is very similar to the *Sphærium Bahiense*, Spix, of Brazil; it is, however, much larger and somewhat more inflated.

3. *Sphærium Portoricense*, Prime.—S. testa elongato-transversa, rhomboidea, æquilaterali, tenui, cornea, transversim fortiter striata; valvis crassiusculis, nigro irregulariter maculatis; extremitatibus obtusa, utroque latere æqualiter declivi; dentibus cardinalibus inconspicuis, lateralibus subæqualibus, antico majore.

Long.  $\frac{1}{4}$ ; lat. 1-5th; diam.  $\frac{1}{6}$  poll.

*Hab.* Portorico; (Collect. Swift et Prime.)

Very similar in shape to the young of *Sphærium sulcatum*, Lam. This species differs from the generality of West Indian and South American Sphæria by its sulcations, which are quite heavy for its size.

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Descriptions of new Lower Silurian, (Primordial), Jurassic, Cretaceous, and Tertiary Fossils, collected in Nebraska, by the Exploring Expedition under the command of Capt. Wm. F. Reynolds, U. S. Top. Engrs.; with some remarks on the rocks from which they were obtained.

BY F. B. MEEK AND F. V. HAYDEN.

The geological collections brought in by Captain Reynolds' expedition, although, as might be expected, not containing so large a number of new species, as those of some earlier explorers of the north-west, afford several very interesting new forms, and furnish much important information in regard to the geographical distribution of previously known species. They also afford us much valuable information respecting the extent and range of the various groups of rocks, so widely distributed throughout the great area of his explorations.

In the present paper we give descriptions only, of the new species contained in these collections. We have, however, in course of preparation for Capt. Reynolds' final Report, full illustrations, with more extended descriptions of these, together with complete catalogues of all the previously known forms. Before commencing these preliminary descriptions, it may not be out of place to make some remarks on the formations from which they were obtained. This we now propose to do in the order of their succession in time, commencing with the oldest.

#### LOWER SILURIAN (PRIMORDIAL) ROCKS.

In March, 1858, we announced in a paper read before the Academy, that we had identified fossils of the age of the Potsdam Sandstone amongst the collections brought by Lieut. Warren's expeditions from the Black Hills, Nebraska. Previous to that time, no organic remains of that age had been recognized either from there or from the Rocky Mountain ranges farther west. The specimens

[NOTE.—We take pleasure in acknowledging here our renewed obligations to Prof. Henry, for the free use of the extensive collection of works on geology, palæontology, &c., in the library of the Smithsonian Institution, and for other facilities of great value to us in the prosecution of these investigations.]

1861.]

then identified by us were collected by one of the writers, (Dr. H.,) who acted as geologist of Lieut. Warren's expedition. They consist of *Lingula prima*, *L. antiqua*, and an *Obolella*, with fragments of a *Trilobite* of Primordial type, similar to some of those occurring in rocks of that age in Wisconsin.

In the following pages of this paper we give descriptions of apparently the same *Trilobite* mentioned above, and of a small *Pteropod*? of the genus *Pugiunculus*, from the Primordial or Potsdam Sandstone at a locality near the head of Powder River, on Big Horn Mountains, a part of the Rocky Mountain range, near 43° 30' N. lat. long. 108° W. These fossils were collected by one of the writers, (Dr. Hayden, who acted as geologist of Capt. Reynolds' expedition,) from a brownish somewhat laminated sandstone, also containing a *Lingula* apparently identical with *L. antiqua*, but smaller than the average size of that shell. At this and other localities along the Rocky Mountains, west of the Black Hills, as well as at the latter, this rock was seen resting either directly upon granitic masses, or ancient upheaved metamorphic slates. At the Black Hills, it is usually only from 50 to 80 feet in thickness, but in the Big Horn Mountains, it sometimes attains a thickness of two hundred feet.

Up to this time, we have no positive evidence of the existence of any of the usually succeeding Silurian and Devonian rocks, throughout all this region, north of the South Pass, lat. 42° 31' N. long. 109 W. From the latter locality, we have identified specimens of *Halysites catenulata* and a few other fossils probably of upper Silurian age.\* North of this, however, so far as we know, the Primordial Sandstones, are directly succeeded by heavy deposits of Carboniferous age, of arenaceous and more or less pure limestones. Surmounting the latter there were also seen occasional local beds of magnesian limestones of the same age, and containing some of the same fossils as those referred by us and others in eastern Kansas, to the Permian epoch. As it is our purpose, however, to confine our remarks more particularly to the strata from which the fossils described in this paper were obtained, we pass on to the

#### JURASSIC ROCKS.

In a paper already referred to, (published by us in the March number of the Proceedings for 1858), we announced that we had identified Jurassic types of fossils among the collections brought in from the Black Hills, by Lieut. Warren's expedition. So far as we know, these were the first true Jurassic fossils ever identified from the region of the Rocky Mountains. In April, 1860, one of the writers, (F. B. M.,) and Mr. Henry Engelmann, recognized some of the same species along with a few new forms, in the collections brought by Capt. Simpson's expedition, from equivalent beds at Red Buttes on the north Platte, and from near Uintah and Weber River, in Utah.†

The specimens of this age collected during Capt. Reynolds' expeditions are in part from near the head of Wind River Valley, in the Rocky Mountains, lat. 43°, 30' N., long. 110° W., and from Big Horn Mountains, lat. 43° 30' N., long. 108 W. At both of these localities, at the Black Hills, and at the Red Buttes on the north Platte, as well as at the other localities already mentioned in Utah, the rocks containing these Jurassic fossils consist of a series of grayish, ash-colored, and red argillo-calcareous, more or less gritty strata, with beds of soft dark brown, and reddish sandstones. These beds preserve a remarkable uniformity of characters, taken as a group, wherever they have been seen, and need never be confounded with the Cretaceous or Tertiary rocks so widely distributed over the north-western Territories, even where no fossils are to be found. They are usually only seen as we approach the mountains, near which they rise from beneath the Cretaceous strata.

The organic remains found in this series present, both individually and as a group, very close affinities to those of the Jurassic epoch in the old world; so close indeed, that in some instances, after the most careful comparisons with

\* Transac. American Philosophical Society, March 4, 1859, page 137.

† See Proceedings of the Academy, April, 1860, p. 129.

figures and descriptions, we are left in doubt whether they should be regarded as distinct species, or as varieties of well known European Jurassic forms. Among those so very closely allied to foreign Jurassic species, may be mentioned an *Ammonite*, we have described under the name of *A. cordiformis*, which we now regard as probably identical with *A. cordatus* of Sowerby,—a *Gryphæa* we have only been able to distinguish as a variety, from *G. calceola*, Quenstedt,—a *Pecten* scarcely, distinguishable from *P. lens*, Sowerby,—a *Modiola* very closely allied to *M. cancellata* of Goldfuss,—a *Belemnite*, agreeing very nearly with *B. excentricus*, Blainville, &c. &c.

At the same time that the fossils of this group of strata are generally so closely analogous to known Jurassic species of the old world, they are all clearly distinct from any of those found in our Cretaceous rocks above. In short, their Jurassic age is as susceptible of demonstration, both upon stratigraphical and palæontological evidence, as that the succeeding rocks above them, or any part of the Green sands of New Jersey, belong to the Cretaceous epoch. The facts likewise, nearly all, as we have mentioned on former occasions, point to the conclusion that they hold a rather low position in the Jurassic system.

At nearly all the localities already mentioned, where these well marked Jurassic rocks occur, there is at their base a more or less extensive series of brick red strata, composed of fine grained, arenno-argillaceous material, with local intercalated beds of gypsum. These red strata seem to be nearly always destitute of organic remains, but from their position we have been inclined to regard them as probably of Triassic age. During Capt. Reynolds' expedition, however, some fossiliferous seams were found near their base, probably 300 feet below the horizon of the beds containing so many Jurassic fossils. Amongst these we recognize our *Lingula brevirostra*, and *Monotis curta*, Hall, sp., both of which are common in the beds containing the Jurassic fossils at the Black Hills. From this fact we are inclined to think that at least a large part of the red gypsum-bearing strata of this region, should also be included in the Jurassic system.

These red beds augment greatly in thickness as we go southward; and as Dr. Newberry and others have shown, similar, if not equivalent strata, are developed on a grand scale in New Mexico. Whether this vast series of red beds in the south-west belongs to the Jurassic or Triassic epoch, or whether they represent both in part, are questions it would be wandering from our subject to attempt to discuss here.

## CRETACEOUS ROCKS.

### LOWER SERIES.

In our paper of March 1858, already cited, we mentioned having recognized fresh or brackish-water shells in Lieut. Warren's collections from the south-west base of the Black Hills, obtained apparently from the base of the Cretaceous series, of that region. These fossils consist of a *Unio*, a small *Planorbis*, and fragments of some small univalves like *Paludina*, all of which were found associated with imperfect specimens of *Ostrea*. The beds containing these fossils present a somewhat mixed character, being composed, in part, of light gray clays, and purple argillo-calcareous seams. The fresh-water shells were found in the latter hard seams, which sometimes assume nearly the aspect and composition of a true limestone. This formation rests directly upon the Jurassic strata, and seems to pass beneath the older Cretaceous beds.\*

\* At the time we published these facts, we were led by the discovery here of fresh-water shells, in such a position, to think that some estuary deposits of doubtful age, near the mouth of Judith River, on the Missouri, from which Dr. Leidy had described some Saurian remains resembling Wealden types, might be older than Tertiary. Later examinations, however, have demonstrated, that the Judith beds contain an entirely different group of fossils from those found in the rock under consideration, and that they are really of Tertiary age, and hold a position at the base of the Great Lignite series of the north-west.

Amongst Capt. Reynolds' collections now before us, from the head of Wind River Valley, we also recognize, from a precisely similar bed, fragments of a *Unio*, with great numbers of a *Melania*, and a beautiful little *Neritella*, which, although completely mineralized, retains its original zig-zag bands of dark and light colors.\* The bed containing these fossils, here, like that at the Black Hills, rests directly upon the Jurassic strata, and appears to dip beneath the Cretaceous, while its fossils are in exactly the same state of preservation as those collected at the Black Hills. As it differs at both these localities in its lithological characters from all of the well-defined Tertiary beds of the northwest; and its fossils are not only clearly distinct from the known Tertiary forms of that region, but all present a more ancient aspect, we are still inclined to think it really holds a position near the lower part of the Cretaceous series of that region.

Until this can be determined, however, upon stratigraphical evidence, we do not feel warranted in assigning this formation a place in the general section of the Cretaceous rocks of the northwest, since it may prove to be of Tertiary, or even possibly of Jurassic age. For, as all palæontologists are aware, the remains of fresh-water mollusca cannot be relied upon in determining the age of strata, excepting where they happen to be specifically identical with forms known to occur elsewhere in well established horizons. This arises from the fact that they are very similar in rocks of all ages in which they are known to occur, or at least that they do not present peculiar distinctive features in different formations, in so marked a degree as marine shells.

Since the first publication of a general section of Nebraska Cretaceous Rocks, based upon observations made by us in 1853, while on an expedition for Prof. Hall, and subsequently published by him and one of the writers, (F. B. M.), in the Memoirs of the American Academy of Arts and Sciences,† our knowledge of the range and thickness of these rocks, as well as of their relations to each other, and to Cretaceous beds elsewhere, has been much extended. We have also been able, from the collections subsequently brought in by various expeditions from localities scattered over wide areas, not merely to add largely to the number of species previously known to be embraced in the Cretaceous fauna of this region, but we have also extended our knowledge of their geographical distribution and vertical range. Consequently we have now the means of constructing a section of these rocks that will give a more clear and accurate idea of the relative importance and thickness of the subdivisions, as well of their relations to each other and of each to the whole.

Hitherto in all the sections of these rocks published, the subdivisions have been designated merely by the numbers 1, 2, 3, 4 and 5. Experience has taught us that inconvenience and confusion are apt to arise from the use of this kind of a nomenclature, because these larger groups are constantly liable to be confounded with unimportant subdivisions of local sections, to which it is almost indispensably necessary to apply numbers. This being the case, we propose to designate each of these formations by a distinct name, retaining, however, opposite each name the same number formerly used for each group. In selecting names, we have preferred those derived from localities to such as might be suggested by the lithological or palæontological characters of the different rocks; because, however appropriate such a name as "Inoceramus Bed" or "Silicious Group" may be for a formation at a given locality, it will generally be found inapplicable if we attempt to trace the rock over areas of any great extent. Our names have also been selected from localities where the particular formation named is known to be well developed, and readily recognizable. In accordance with these views, we present the following section:—

\* Descriptions of the latter two fossils are given in another part of this paper.

† Mem. Am. Acad. Arts and Sci., Boston, vol v, N. S., p. 381.

General Section of the Cretaceous Rocks of Nebraska.

DIVISIONS AND SUBDIVISIONS.		LOCALITIES.	Estm. thick- ness.	
UPPER SERIES.	Fox Hills beds. Formation No. 5.	Gray, ferruginous and yellowish sandstone and arenaceous clays, containing <i>Belemnites bulbosa</i> , <i>Nautilus Dekayi</i> , <i>Ammonites placenta</i> , <i>A. lobatus</i> , <i>Scaphites Conradi</i> , <i>S. Nicoll-ii</i> , <i>Baculites grandis</i> , <i>Busycon Burdi</i> , <i>Fusus Culbertsoni</i> , <i>F. Newberryi</i> , <i>Aporrhais Americana</i> , <i>Pseudo-buccinum Nebraskaensis</i> , <i>Mastra Warrinana</i> , <i>Cardium subquadratum</i> , and a great number of other molluscous fossils, together with bones of <i>Mosasaurus Missouriensis</i> , &c.	Fox Hills, near Moreau River,—near Long Lake above Fort Pierre. Along base Big Horn Mountains, and on North and South Platte Rivers.	500 feet.
	Fort Pierre Group. Formation No. 4.	Dark gray and bluish plastic clays, containing near the upper part, <i>Nautilus Dekayi</i> , <i>Ammonites placenta</i> , <i>Baculites ovatus</i> , <i>B. compressus</i> , <i>Scaphites nodosus</i> , <i>Dentalium gracile</i> , <i>Crassatella Evansi</i> , <i>Cucullæa Nebraskaensis</i> , <i>Inoceramus Sagensis</i> , <i>I. Nebraskaensis</i> , <i>I. Vanuxemi</i> , Bones of <i>Mosasaurus Missouriensis</i> , &c., &c., &c.  Middle zone nearly barren of fossils.  Lower fossiliferous zone, containing <i>Ammonites complexus</i> , <i>Baculites ovatus</i> , <i>B. compressus</i> , <i>Helicoceras Mortoni</i> , <i>H. lotium</i> , <i>H. umbilicatum</i> , <i>H. cochleatum</i> , <i>Ptychoceras Mortoni</i> , <i>Fusus vinculum</i> , <i>Anisomyon borealis</i> , <i>Anauropsis pulvuliniformis</i> , <i>Inoceramus sublaevis</i> , <i>I. tenuilincatus</i> , bones of <i>Mosasaurus Missouriensis</i> , &c.  Dark bed of very fine nctuous clay, containing much carbonaceous matter, with veins and seams of gypsum, masses sulphuret iron and numerous small scales fishes. Local; filling depressions in the bed below.	Sage Creek, Cheyenne River and on White River above the Mauvaises Terres.  Fort Pierre and out to Bad Lands,—down the Missouri on the high country to Great Bend.  Great Bend of the Missouri, below Fort Pierre.  Near Bijou Hill, on the Missouri.	700 feet.
	Niobrara Division. Formation No. 3.	Lead gray calcareous marl, weathering to a yellowish or whitish chalky appearance above. Containing large scales and other remains of fishes, and numerous species of <i>Ostrea congesta</i> attached to fragments of <i>Inoceramus</i> . Passing down into light, yellowish and whitish limestone, containing great numbers of <i>Inoceramus problematicus</i> , <i>I. pseudo-mytiloides</i> , <i>I. aviculoides</i> and <i>Ostrea congesta</i> . fish scales, &c.	Bluffs along the Missouri below the Great Bend, to the vicinity of Big Sioux River; also below there on the tops of the hills.	200 feet.
LOWER SERIES.	Fort Benton Group. Formation No. 2.	Dark gray laminated clays, sometimes alternating near the upper part with seams and layers of soft gray and light-colored limestone. <i>Inoceramus problematicus</i> , <i>I. lemuistrostratus</i> , <i>I. latus?</i> <i>I. fragilis</i> , <i>Ostrea congesta</i> , <i>Venilia Mortoni</i> , <i>Phaladomya papyracea</i> , <i>Ammonites Mullani</i> , <i>A. percarinatus</i> , <i>A. vesperlinus*</i> <i>Scaphites Warreni</i> , <i>S. larvaformis</i> , <i>S. ventricosus</i> , <i>S. verniformis</i> , <i>Nautilus elegans?</i> &c.	Extensively developed near Fort Benton on the Upper Missouri; also along the latter, from ten miles above James River to Big Sioux River, and along the eastern slope of the Rocky Mountains, as well as at the Black Hills.	800 feet.
	Dakota Group. Formation No. 1.	Yellowish, reddish and occasionally white sandstone, with at places, alternations of various colored clays and beds and seams of impure lignite. Also silicified wood, and great numbers of leaves of the higher types of dicotyledonous trees: with casts of <i>Pharella? Dakotensis</i> , <i>Azinaea Siouxensis</i> , and <i>Cyprina arenarea</i> .	Hills back of the town of Dakota; also extensively developed in the surrounding country in Dakota County below the mouth of Big Sioux River,—thence extending southward into Northeastern Kansas and beyond.	400 feet.

(Senonian, D'Orbigny.)

Eq. Upper or White Chalk and Maestricht beds. (Senonian and Eocene.)

Eq. Lower or Gray Chalk (and Upper G. Sand) of British Geologists (Paronian and Eocene.)

\* This is *A. Texanus* of Roemer. It is on the authority of Mr. Gabb that it is here regarded as identical with *A. vesperlinus* of Morton. We should never have suspected this from Dr. Morton's figure, but Mr. Gabb assures us that after a careful comparison of Dr Morton's specimen, he can see no difference.

Geologists will understand that we do not regard the several rocks to which we have applied the names "Dakota Group, Fort Benton Group," &c., as being always separately and individually recognizable at widely distant parts of the world, nor even in all cases throughout North America. They are, merely, convenient subdivisions, presenting more or less marked lithological and palæontological peculiarities, due to physical agencies that were probably, in some instances, comparatively local in their action; though in other cases we have been able to identify the equivalents of some of them, as we have shown on former occasions, in New Jersey, Alabama and New Mexico.\* When we wish to draw parallels between these rocks and those of the Cretaceous System of the Old World, however, we find it necessary to group them together, so far as our present knowledge extends, into two, or at any rate, not more than three principal series.

**DAKOTA GROUP.**—Although we still retain this as a distinct rock, our present impression is, that it is probably only a subdivision or member of the Fort Benton Group. Still, until more fossils can be obtained from it in the region of the typical localities, the question whether or not it should rank as a distinct formation must remain an open one. That it is at least as old as the Fort Benton Group, however, is clearly demonstrated by its position beneath some two hundred feet of that rock near the mouth of Big Sioux River, where the latter formation is seen to pass beneath the Niobrara Division. This order of superposition is also known to prevail throughout a considerable area in north-eastern Kansas, and south eastern Nebraska, as may be seen at hundreds of localities where all the strata lie in a nearly horizontal position.

That this rock cannot be referred to any older epoch than the Cretaceous, is also equally clear from the modern affinities of numerous fossil leaves embedded in it. Amongst these remains Dr. Newberry and Prof. Heer, have identified the genera *Populus*, *Salix*, *Abies*, *Platanus*, *Liriodendron*, &c., &c.† The few animal remains yet found in it are merely casts of shells referable to the genera *Pharella*, *Axinaca*, *Maetra* and *Cyprina*.

Along the Missouri, in the region of the mouth of Big Sioux River, and below, this rock consists mainly of yellowish and reddish sandstones, in rather thick beds, interstratified, however, at places, with beds of yellow and ash-colored clays, and impure lignite. In this region it is generally quite distinct from the Fort Pierre Group above, but farther south, in Kansas, the two rocks seem to be less distinct, while at the Black Hills and along the Rocky Mountains west of there, the whole appears to be represented at places by a series of alternating sandstones and clays.

Below the mouth of Big Sioux River, this formation is seen at some localities resting directly upon the limestones of the Coal Measures; but in north-eastern Kansas it usually reposes on a series of reddish and various colored clays, probably of Jurassic age. Near the Black Hills, and along the Rocky Mountains west of there, apparently representative beds were usually seen to be immediately underlaid by well marked Jurassic strata, excepting at the localities where the brackish-water deposits already mentioned, appear to intervene between them and the Jurassic.‡

This rock has not yet been satisfactorily recognized on the upper Missouri, though there is a similar formation near the mouth of Judith River and below there, which we have sometimes thought may possibly represent it. Until we can know more, however, in regard to the relations of the Judith River bed to the other rocks of the series in that region, and have an opportunity to examine more of its fossils, it would be unsafe to refer it to the Dakota Group. The

\* See Proceed Acad. Nat. Sci., Phila., Nov., 1856, p. 267, and May, 1857.

† Proceed. Acad., Dec., 1858; Am. Journ. Sci., New Ser., vol. xxvii, 1859; also March, 1860.

‡ This brackish-water bed we think probably belongs to the formation under consideration.



fossils collected from the sandstone here alluded to, near the Judith River, belong to the genus *Inoceramus*, *Tancredia*, *Maetra*, *Baculites*. &c.; all of which are distinct from the species yet obtained from any of the known horizons elsewhere.

In our paper of May, 1857, we pointed out that the Dakota Group, (which we then designated as formation No. 1,) is represented in New Jersey and Alabama, by a series of more or less arenaceous clays and sandstones, with lignite and leaves of dicotyledonous trees.\* Since that time Dr. Newberry has traced it from near the Arkansas River, in Kansas Territory, by the remains of its characteristic flora, far into New Mexico, where he found it surmounted by a great thickness of well marked Cretaceous rocks.† Dr. Shumard also thinks he can recognize it in Texas at the base of the Cretaceous series of that state.‡

FORT BENTON GROUP.—This formation usually consists of dark grey laminated clays, with thin lighter colored arenaceous partings, and layers and beds of sandstone. Towards the upper part, near its connection with the Niobrara Division above, it sometimes includes intercalated layers of grey limestone in all respects similar to the lower portion of the overlying rock; while at some other places its upper portion passes into a dark shale. It seems to attain its greatest thickness in the vicinity of Fort Benton, where the entire hills eight or nine hundred feet in height appear to be composed of it. Until we can have more exact information, however, in regard to the range of the organic remains, through this great thickness of strata, we must have some doubts in regard to whether there may not also be some representation here of the Dakota Group.

This seems to be the more probable, when we bear in mind that the rock under consideration, becomes, as already stated, blended with the latter formation further south at the Black Hills, and along the Rocky Mountains west of them.

The Fort Benton Group has a wide geographical extension in the country west of the Mississippi,—though neither it nor the succeeding rock above, appears to have any well defined representatives as a distinct formation in Alabama, New Jersey and other states east of the Mississippi, as was pointed out by us in May, 1857.§ The highest northern locality at which we have any knowledge of its existence is on the north branch of the Saskatchewan, some thirty or forty miles west of Fort *a la Corne*, near lat. 54 north, where Prof. Hinde discovered specimens which were referred by one of us (F. B. M.) to this horizon.|| We had also previously referred to the same position some specimens discovered by Prof. S. I. Dawson at a locality 250 miles west of Fort Garry, on the Assiniboine River.¶

It is known to occur in north-eastern Kansas, as well as in Arkansas, and in 1857 we pointed out that it is probably represented by one of the beds in Mr. Marcou's section of Pyramid Mountain, in the far south-west. Dr. Newberry's investigations, in connection with Lieut. Ives' Expedition, seem to show that it

\* Proc. Acad. Nat. Sci., Philad., Mar., 1857, p. 117; also, see page 426, of this paper.

† American Journal Sci. Ser. vol. xxix, p. 208, March, 1860.

‡ See an important paper on the Geology of Texas, by Dr. B. F. Shumard, in Trans. St. Louis Acad. Sci., Vol. i. p. 582. It is a source of much regret to those interested in the progress of geological science in this country, that circumstances have prevented this able geologist from completing the survey of Texas.

§ We have sometimes suspected that the bed in New Jersey containing *Venilia Conradi*, *Scaphites hippocrepis*, and *Pholadomya occidentalis*, Morton, might belong to this horizon, from the analogy of these species to some of our far western Fort Benton Group forms, but we have been assured that they occur in New Jersey, mingled with other species only found in our upper Cretaceous beds of Nebraska.

|| See Prof. Hind's Report on Saskatchewan and Assiniboine, Expl. Exp. p. 179. Toronto, 1859.

¶ See Prof. Dawson's Report on Explorations of the country between Lake Superior and the Red River Settlements, p. 18. Toronto, 1859.

is extensively developed in New Mexico; though it appears there to be generally inseparably blended with the Niobrara Division, the two forming together the middle division of his section of the Cretaceous of New Mexico, which attains a thickness of from twelve to fifteen hundred feet. Dr. Shumard has also identified it in Texas, where it is apparently quite thin.\*

All the facts show that this rock thins out, both in the south, and at the north, in an easterly direction, its greatest thickness being at Fort Benton, and along the mountains south of there, and in New Mexico; while on the Missouri, between James and Big Sioux Rivers, it is only about one hundred feet in thickness, and Dr. Shumard gives fifty feet as its thickness in his Texas section.

This formation contains a number of interesting organic remains, some of which are known to have a wide geographical range, and, as may be seen by the foregoing section, also pass up into the succeeding rock above. We also have reason to believe that several of them likewise occur further south, in the formation below, thus apparently linking together, as already suggested, these three rocks as subordinate members of one great series. At any rate, the fossils described by Dr. Shumard from the "Marly Clay, or Red River Group" of his Texas section, which we think he has correctly placed on a parallel with our Dakota Group (=No. 1 of former sections), are both individually, and as a group, apparently very closely allied to forms occurring in the formation under consideration, in Nebraska. For instance, his *Inoceramus capulus* is scarcely distinguishable, as he has suggested, from our *I. unbonatus*; and we think it probable his *Ammonites Graysonensis* is not distinct from *A. percarinatus*, Hall & Meek. Again, his *Scaphites vermiculus* is allied to our *S. larvæformis*.

NIORBARA DIVISION.—The typical localities of this rock are along the Missouri, near the mouth of Niobrara river, where it forms perpendicular cliffs from ninety to one hundred feet in height. In this region it consists mainly of lead gray richly calcareous marl, which, where long exposed, assumes a light buff or whitish color, and presents much the appearance of true chalk. Below, it passes into more compact beds of soft bluish gray limestone. It is first seen in descending the Missouri, a short distance below the Great Bend, where it rises by a gentle dip from beneath the succeeding formation (the Fort Pierre Group). Further down the river it is seen to rise higher and higher, and gradually assumes the character of a surface rock, not far below the mouth of Niobrara river. When much exposed to the action of the weather, here and on Little Blue river, near the northern boundary of Kansas, it becomes a rather hard whitish limestone.

This formation can be traced by exposures in north-eastern Kansas, near Little Blue and Smoky Hill rivers, through Arkansas into Texas and New Mexico. In 1857 we pointed out that it is represented by the upper beds of Mr. Marcou's Pyramid Mountain Section; and Dr. Shumard has placed the "Washita Limestone," and "Indurated Gray Marl" of his Texas section, on a parallel with it and two of the same beds in Mr. Marcou's section.

At the Black Hills this rock sometimes presents its normal appearance, but generally there, as well as along the Rocky Mountains further west, it is scarcely distinguishable lithologically from the formation below. The fossils hitherto found in it in Nebraska, are *Ostræa congesta*, *Inoceramus problematicus*, *I. aviculoides*, and a small *Baculite*, together with large scales of fishes. All excepting the fish scales being identical with species found in the strata beneath. *Inoceramus problematicus*, or at least a form scarcely distinguishable from that species, and *Ostræa congesta*, occur in it almost every where that it has been met with.

In Texas, Dr. Shumard found in the bed he places on a parallel with this formation, *Holaster simplex*, *Epiaster elegans*, *Cidaris hemigranosus*, *Gryphæa Pitcheri* (common variety and *G. Tucumcarii*) *G. sinuata*, Marcou (not Sowerby),

\*Transactions St. Louis Academy Sciences, vol. I, p. 583.

*Ostrea subovata* (= *O. Marshii*, Marcou), *O. carinata*, *O. quadriplicata*, *Janira Texana*, *J. Wrightii*, *Inoceramus problematicus*, *Pachymya Austincensis*, *Lima crenulicosta*, *Perebratula Wacoensis*, *Turrillites Brazoensis*, *Ammonites Texanus*, *A. Brazoensis*, *Hamites Fremonti*, and *Nautilus Texanus*.

RELATIONS OF THE LOWER CRETACEOUS SERIES OF NEBRASKA TO SUBDIVISIONS AT FOREIGN LOCALITIES.—Having now considered, in the order of their succession, the several rocks embraced in the Lower Series of the Nebraska Cretaceous deposits, and endeavored as far as our present means of investigating the subject enables us to do, to trace out their relations to the Cretaceous beds of other parts of this country, it will be interesting to see how nearly their synchronism with known horizons in the Cretaceous system of the old world can be traced out. With this view we have carefully compared with European forms all the fossils in the several Nebraska collections from these rocks, including those most recently obtained, to which the new species described in this paper belong. These comparisons have satisfied us that the formations under consideration,—that is, the Niobrara Division, Fort Benton Group, and the Dakota Group, represent together the Lower or Gray Chalk, and probably the Upper Green Sand of British geologists (= *Turonien* and *Cenomanien*, of D'Orbigny.) We had in 1856, identified the Gray Chalk species *Inoceramus problematicus* in the Niobrara Division (No. 3 of former sections), and suggested that this rock probably holds a position at about the horizon of the Lower Chalk of the old world.\* More recently we had likewise mentioned that we regarded *Ammonites percarinatus*, Hall & Meek, as being probably identical with the well known Lower Chalk species *A. Woolgari* of Mantell.† These facts, however, had not so forcibly attracted our attention until we commenced the investigation of the collections containing the new species described in this paper.

The evidence upon which we have placed these rocks on a parallel with the Lower or Gray Chalk of British geologists, will be more clearly understood by consulting the following list of species from them, which are either identical with, or so closely allied to, species found in that position in the old world, as to be safely regarded we think, as contemporaneous representative forms:—

Found in the Lower Series of Nebraska.	European Lower Chalk species.
<i>Ammonites vespertinus</i> Mort.,	represents <i>A. Rhotomagensis</i> Deffr., & other L. Chk. sp.
<i>A. percarinatus</i> H. & M.,	.....probably ident. with <i>A. Woolgari</i> of Mantell.
<i>Scaphites Warreni</i> M. & H.,	.....scarcely distinct from <i>S. æqualis</i> Sowerby.
<i>S. larvaformis</i> M. & H.,	..... same type as " " "
<i>Nautilus elegans</i> var.,	.....can scarcely be distinct from <i>N. elegans</i> Sowerby.
<i>Inoceramus latus</i> ?	..... appears to be the same as <i>I. latus</i> of Mantell.
<i>Inoceramus problematicus</i> †	.....can not be distinguished from <i>I. problematicus</i> , [Schlot. sp.

*Inoceramus problematicus* is most frequently met with in the Niobrara division, but is also sometimes found in the Fort Benton Group: all the others are generally peculiar to the latter rock in Nebraska. *Inoceramus latus*, *Ammonites vespertinus*, and a species very closely allied to *Nautilus elegans*, are found in Texas in beds apparently representing the Niobrara division. Other species from our Lower series of Nebraska similar to Lower Chalk forms of the old world, might be mentioned, but the foregoing list includes the most striking examples.

We may, however, state that, with a few doubtful exceptions, nearly all the other species yet known in the lower series of Nebraska Cretaceous rocks, present much nearer affinities to Lower Chalk forms than to species holding a

\* Proceed. Acad. Nat. Sci. Phila. Nov. 1856, p. 267.

† Proceed. Acad. Nat. Sci. Phila. October, 1860, p. 419. Mr. Gabb has also suggested in a note to p. 129, of his Synopsis of Cret. Foss. that the rocks under consideration may represent the Lower Chalk of England.

‡ This species is said to also occur in the Upper Green Sand of Europe. 1861.]

higher position in the Cretaceous of the Old World. The most important exception to this rule we have met with is *Inoceramus umbonatus*, which is evidently closely allied to *I. involutus* of Sowerby, from the Upper or White Chalk. There still remains, however, some doubts in regard to the position of this fossil in the Nebraska formations, no specimens of it having yet been collected *in situ* by any person familiar with the order of succession of the Nebraska rocks.

#### UPPER CRETACEOUS SERIES OF NEBRASKA.

FORT PIERRE GROUP.—In the foregoing review of the Lower Series of Nebraska Cretaceous rocks, it has been shown that the subdivisions often shade into each other lithologically, and that at least the upper two members, are so intimately related by the range and affinities of their organic remains as to indicate that they are merely subordinate formations of one great series, or primary division of the Cretaceous system. There seems to be no horizon at which we can, upon palæontological principles, draw a sharp line separating the beds below from those above, until we ascend to the top of the Niobrara Division. In crossing this line, however, we not only generally observe a marked lithological change, but, so far as our present knowledge extends, we meet with the remains of an entirely different group of animals. It is true, nearly or quite all the genera seen in the beds below, are still observed, along with many others in the strata above this horizon; but the species yet found in these upper formations, in Nebraska at least, are all distinct from those hitherto found in the lower series.

We are aware that further investigations may possibly show closer relations between the organic remains of the upper and lower series of these rocks in this region than have been hitherto discovered. Yet, when it is borne in mind that our conclusions are based upon a careful study and comparison of extensive collections from numerous localities, scattered over a great area of country, it will be readily understood how very improbable it is that future explorations will materially modify these results.

At the base of the Fort Pierre group,—the inferior member of the upper series of Nebraska Cretaceous rocks,—there is, at some localities along the Missouri below the Great Bend, a local bed ten to thirty feet in thickness, composed of very dark unctuous clay, containing great numbers of small scales of fishes, much iron pyrites and carbonaceous matter, with crystals, veins and seams of sulphate of lime. This bed usually occupies depressions in the previously eroded upper surface of the formation beneath.

With the exception of the local deposit just mentioned, the Fort Pierre Group consists of a vast accumulation of fine gray and dark colored clays in moderately distinct layers, but never presents a laminated or slaty structure like the Fort Benton Group. When wet, these clays are soft and plastic, but in drying they often crack and crumble so as to obliterate the marks of deposition in vertical exposures.

This formation composes all the hills on both sides of the Missouri at Fort Pierre, and much of the country between there and the Bad Lands. It also forms the bluffs along the river below Fort Pierre to the Great Bend, just below which the Niobrara Division rises above the level of the Missouri. From the Great Bend down to the mouth of Niobrara River, the country is made up of these two formations, which rise with the general inclination of all the rocks in this region, so that the Fort Pierre Group finally runs out in the form of outliers on the tops of the hills below the mouth of Niobrara River. Above Fort Pierre, it gradually sinks beneath the Fox Hills Group in the region of Cheyenne and Moreau Rivers, but continues to be seen in the bluffs of the Missouri and other streams for some distance beyond.

On the Upper Missouri, this formation comes to the surface again, and forms much of the country in the region of Milk and Muscle Shell Rivers. It is also known to extend far up into the British possessions,—some of its fossils having

been discovered on the Saskatchewan by an expedition sent out by the Canadian Government in 1858, under the direction of Prof. S. J. Dawson.\*

Several of the characteristic fossils of this formation were also discovered, in 1858, on the South Branch of the Saskatchewan, as well as on the Assiniboine and Little Souris Rivers, by another Canadian Government expedition, under the charge of Prof. Henry Y. Hind.†

This formation is also known to be well developed at the Black Hills and along the Rocky Mountains west of there in Nebraska, and extends southward at least as far as the region of Pike's Peak. It also exists in Texas, though it probably only occurs as thin local patches in the country between the Rocky Mountains and the Mississippi south of Nebraska. We had pointed out its probable existence in Texas in 1856;‡ and Dr. Shumard has, as we think, correctly placed on a parallel with it the "Austin Limestone" and "Fish-bed" of his section of the Texas Cretaceous rocks.§

The Fort Pierre Group is also known to be represented on the western borders of North America, or more properly, on Vancouver Island, as well as on Suvia Islands in the Gulf of Georgia.||

Coming eastward we find it again represented in New Jersey, and extending thence through into Alabama and other Southern States. As long back as 1834, Dr. Morton had suggested in his Synopsis of Organic Remains, p. 25, that the beds at the Great Bend of the Missouri, are probably on a parallel with the Green Sand of New Jersey. The identity of a few of the Nebraska Cretaceous fossils with New Jersey species, was also pointed out by Prof. Hall, and one of the writers (F. B. M.) in a paper published in the Memoirs of the American Academy of Arts and Sciences, vol. 5, N. S., p. 406, 1854; though too little was then known in regard to the range of the fossils in the Nebraska beds, to warrant any attempt at drawing parallels between subdivisions.

In Nov., 1856, after we had ascertained with some degree of accuracy the position and range of particular species in the Nebraska series, and had learned from the New Jersey Reports and from Prof. Cook, the range of the same forms in New Jersey, we remarked that "the occurrence of several of the more common and characteristic fossils of the upper two Nebraska formations, [Fort Pierre Group and Fox Hill Beds,] such as *Ammonites placenta*, *Scaphites Conradi*, *Baculites ovatus*, *Nautilus Dekayi*," &c., in the first and second Green Sand beds, and the intervening ferruginous stratum in New Jersey, as well as in the "Rotten Limestone" of Alabama, clearly indicates the synchronism of these deposits, notwithstanding their widely separated geographical positions.¶

In May, 1857, we also submitted to the Academy another paper in which we discussed more at length the relations of the Nebraska Cretaceous rocks to those of New Jersey and other States, giving at the same time for comparison a section of the Cretaceous strata of Alabama, furnished by Prof. Winchell, another of those in Northeastern Kansas, by Mr. Hawn, and a third of the same in New Jersey, compiled from the Reports of Prof. Ketchell and Prof. Cook.\*\*

\* See Report Exploration of the Country between Lake Superior and the Red River Settlement. Toronto, 1859, page 18.

† For figures and descriptions of these fossils, see a paper by one of the writers in Professor Hind's Report of the Saskatchewan and Assiniboine Expedition, page 182. Toronto, 1859.

‡ See note appended to the extra copies distributed by us, of a paper read before the Academy, in Nov., 1856.

§ Observations upon the Cretaceous Strata of Texas, by B. F. Shumard, M. D., State Geologist. Trans. St. Louis Acad. Sci., vol. 1, page 583.

|| See paper by F. B. Meck, describing Cretaceous fossils from Vancouver Island, in Trans. Albany Institute, read Dec., 1856. Also another paper by same, in Proceed. Acad. Nat. Sci. Phila., for Oct., 1861. On the Collections of N. W. Boundary Survey.

¶ Proceed. Acad. Nat. Sci. Phila., November, 1856, p. 267.

\*\* Proceed. Acad. Nat. Sci. Phila., May, 1857, p. 117.

As the last mentioned section of the New Jersey rocks will aid in the clear understanding of remarks and comparisons in other portions of this paper, we reproduce it below as originally published by us in the paper last above cited. The reader will understand that by formations No. 1, No. 4 and No. 5 of Nebraska, in the right-hand column, we referred to the Dakota Group, the Fort Pierre Group and the Fox Hills Beds of this paper;—the intermediate No. 2 and No. 3, (Fort Benton Group and Niobrara Division,) being probably wanting in New Jersey.

*New Jersey Section Compiled from the Reports of that State.*

a.	3d bed. G. Sand.	Green Sand.	60 ft.	Tertiary.
		"The sand between the second and third beds has usually been con-founded with beach sand, which it closely resembles." 45 or 50 ft.		
b.	2d bed. G. Sand.	Yellow limestone.		No. 5. Nebraska.
		Green Sand, <i>Scaphites Conradi</i> , <i>Baculites ovatus</i> , <i>Ammonites placenta</i> .	45 or 50 ft.	
c.		Sand "much colored with oxyd of iron, and when sufficiently firm is found almost full of the impression of shells." <i>Belemnites mucronatus</i> .*	65 or 70 ft.	Represents No. 4, Nebraska.
d.	1st bed. G. Sand.	Green Sand, <i>Nautilus Dekayi</i> , <i>Baculites ovatus</i> , <i>Belemnites mucro-natus</i> ,* and bones of <i>Mosasaurus</i> .	50 ft.	
e.		Dark clays with "occasional streaks and irregular spots of green sand." <i>Ammonites placenta</i> , <i>Baculites ovatus</i> , &c. &c.	130 ft.	Represents No 1 of Nebraska section.
f.		Dark blue, ash colored, and whitish clays, and micaceous sand, with thin seams of coal. Great quantities of sulphuret of iron. "Fossil wood is found in some of the layers in large quantities, and some very distinct impressions of net-veined leaves were examined in the clay at French's landing."	130 ft. or more.	

In an able and lucid article by Prof. Hall, on the distribution of the Cretaceous rocks of America, and their relations at distantly separated localities, published in the American Journal of Science, July, 1857, it will be seen he has arrived at nearly the same conclusions in regard to the Nebraska and N. Jersey beds. He likewise draws the same parallels in an elaborate article in the first vol. of the Report on the U. S. and Mexican Boundary Survey, published during the summer of 1858.†

The Fort Pierre Group generally abounds in fossils in Nebraska, though they are not equally distributed through the whole formation, there being an upper and a lower fossiliferous zone, while a considerable thickness of the middle beds usually contains few organic remains. Its fossils are generally found in a

\* *Belemnitella mucronata*.

† This volume of the Mexican Boundary Report bears the date of 1857 on the title-page, but it was not actually published until the summer of 1858. See American Journal of Science and Arts for July, 1859, p. 149.

fine state of preservation,—the nacre of many of the shells being as brilliant as when the animals were living. In this latter respect they present a marked contrast with the dull appearance of those from the formations below. In most cases they are found enveloped in very hard, dark argillo-calcareous concretions, from a few inches to several feet in diameter. Those occurring in the lower fossiliferous zone, at the base, are, *Mosasaurus Missouriensis*, *Callianassa Danae*, *Ammonites complexus*, *Baculites ovatus* and *B. compressus*, *Illicoceras Mortoni*, *H. cochleatum*, *H. tortum*, *H. umbilicatum*, *Fusus viniculum*, *F. Shumardi*, *Buccinum constrictum*, *Amauropsis paludinaeformis*, *Anisomyon borcalis*, *Inoceramus sublævis*, *I. incurvus*, &c. &c.

In the upper fossiliferous zone, organic remains are more abundant than in the lower; the following list contains the names of many of those usually found at this horizon, viz.,—bones of *Mosasaurus Missouriensis*, with *Nautilus Dekayi*, *Ammonites placenta*, *Scaphites nodosus*, *S. Nicolleii*, *Baculites ovatus*, *B. compressus*, *Aptychus Cheyennensis*, *Fusus subtriturus*, *F. ? tenuilincatus*, *Gladius ? Cheyennensis*, *Margarita Nebrascensis*, *Dentalium gracile*, *Tectura occidentalis*, *Anisomyon patelliformis*, *A. alveolus*, *Bulla Nebrascensis*, † *Xylophaga elegantula*, *Corbulamella gregarea*, *Cardium rarum*, *Lucina occidentalis*, *Crassatella Evansi*, *Moriola Meekii*, *Inoceramus convexus*, *I. Mortoni*, *I. Nebrascensis*, *I. Sagensis*, *I. Vanuxemi*, &c. &c. Several of these fossils pass up into the formation above.

FOX HILLS BEDS.—This formation is generally more arenaceous than the Fort Pierre Group, and also differs in presenting a more yellowish or ferruginous tinge. Towards the base it consists of sandy clays, but as we ascend to the higher beds, we find the arenaceous matter increasing, so that at some places the whole passes into a sandstone. It is not separated by any strongly defined line of demarcation from the formation below, the change from the fine clays of the latter to the more sandy material above, being usually very gradual. Nor are these two formations distinguished by any abrupt change in the organic remains, since several of the fossils occurring in the upper beds of the Fort Pierre Group pass up into the Fox Hills Beds, while at some localities we find a complete mingling in the same bed of the forms usually found at these two horizons. Indeed, we might with almost equal propriety, on palæontological principles, carry the line separating these two formations down so as to include the upper fossiliferous zone of the Fort Pierre Group, as we have defined it, in the formation above. All the facts, however, so far as our present information goes,—taking into consideration the change in the sediments at or near where we have placed the line between these two rocks,—seem to mark this as about the horizon where we find evidences of the greatest break in the continuity of physical conditions.

The formation under consideration is most distinctly marked at Fox Hills, between Cheyenne and Morean Rivers, above Fort Pierre; and it also extends across upon the opposite side of the Missouri, in the region of Long Lake. It likewise immediately underlies the Tertiary bone beds of the *Mauvais Terres* at Sage Creek and other places in the vicinity of White River, but is not very fossiliferous, so far as known, in that region. At a single locality on the Yellow Stone River, about one hundred and fifty miles from its mouth, there is a low exposure having the lithological characters of the Fort Pierre Group, but containing a complete mingling of the fossils usually found in the upper part of that rock, with those generally occurring in this.

On the Upper Missouri, in the region of Mussel Shell and Milk Rivers, the Fox Hills Beds do not seem to be very well defined as a distinct rock. A few specimens, however, apparently from this horizon, were collected by Prof.

† This species we had named *B. occidentalis*, in our paper of March, 1856. As that name had previously been used for a recent species of this genus by A. Adams, it becomes necessary to give our shell another name, and we now propose to call it *B. Nebrascensis*.

Hind's Exploring Expedition in the British Possessions, on the South Branch of the Saskatchewan; and, what is a little remarkable, they occur in a green sand matrix, much like that in New Jersey, excepting that it is more indurated.

At the Black Hills, and along the Rocky Mountains west of there, the Fox Hills Beds are generally well developed. They also occur at Deer Creek on the North Platte, and along the mountains southward at least to the region of Pike's Peak. South of this they have not yet been certainly identified as a distinct rock.

As already stated, we had pointed out, in Nov., 1856, and in May, 1857, that this rock is represented by the upper portion of the Cretaceous beds in New Jersey, (the beds b, c, d and e of the section on page 426 of this paper,) and by the Rotten Limestone of Alabama.

The intimate relations between the Fox Hills Beds and the Fort Pierre Group, already mentioned, make it necessary, when we undertake to trace out the relations between our Cretaceous rocks and those of the Old World, to view these two formations together as one series. Their synchronism with particular portions of the Cretaceous system, at British and other foreign localities, will also be more clearly understood by keeping in view, as a half-way ground, their representative beds in New Jersey, which certainly contain a few foreign species. The evidence of the equivalence of our Upper Cretaceous Series of Nebraska with the upper four divisions of the Cretaceous in New Jersey,—b, c, d and e of the section on page 426 of this paper,—(which we must also take collectively, when we wish to compare them with particular horizons of the Cretaceous abroad), will be more clearly understood by consulting the following list of species common to the New Jersey and Nebraska Upper Cretaceous Series:—

New Jersey Species.	Position in Nebraska Upper Series.
<i>Mosasaurus Missouriensis</i> .....	Ranges through the whole Upper Series.
<i>Nautilus Dekayi</i> .....	Upper zone Ft. P. G. and in F. H. Beds.
<i>Scaphites Conradi</i> .....	Fox Hills Beds.
<i>Ammonites plucenta</i> .....	Upper zone Ft. P. G. and F. H. Beds.
<i>A. complexus</i> .....	Lower zone Ft. Pierre Group.
<i>A. lobatus</i> .....	Fox Hills Beds.
<i>Baculites ovatus</i> .....	Ranges all through Ft. P. Group.
<i>Amauropsis paludinaeformis</i> *.....	Lower zone Ft. P. Group.

We have reason to believe several other species are common to the Upper Series in Nebraska and New Jersey, but we only include in this list those about which there can be no doubt. A list of the closely allied representative species at these distant localities, would, if accompanied by figures, still more clearly illustrate the synchronism of the rocks under consideration.

#### RELATIONS OF THE UPPER CRETACEOUS SERIES OF NEBRASKA TO EUROPEAN DIVISIONS.

Before expressing any opinion in regard to the parallelism of our Upper Cretaceous Series of Nebraska, with particular portions of the Cretaceous of the old world, it is proper that we should give a brief statement of the views of others on this point, as well as in relation to the age of equivalent beds in New Jersey, and in the States farther south.

As is now well known, the Cretaceous strata of New Jersey were first referred to that epoch by the lamented Prof. Lardner Vanuxem; who did not, however, attempt to trace out close parallels between particular beds of the New Jersey strata, and their exact equivalents in the old world. Dr. Morton, to whom we are indebted for figures and descriptions of a large number of the New Jersey fossils, regarded these rocks and their equivalents in Nebraska and the South-

\* This species has been identified in New Jersey by Dr. Isaac Lea.



ern States, as mainly representatives of the Upper Green Sand, or Chalk Marl of Europe. It should not be forgotten, however, that he considered what he had previously called the "Middle Division," that is, the upper calcareous stratum in New Jersey, "contemporaneous with the European White Chalk."\*

Sir Charles Lyell expresses the opinion that the fossils of the New Jersey Cretaceous beds, "on the whole agree most nearly with those of the upper European series from the Maestricht beds to the Gault inclusive."†

Prof. Henry D. Rogers, with his usual sagacity in such matters, remarks in his able Report on the Geology of New Jersey, that he does not regard the Green Sands of that State, "in the strict sense of the word, as the equivalents of the Green Sand formation, so called, of Europe."‡

In his *Cours Elémentaire de Paléontologie*, Alcide D'Orbigny refers the fossiliferous Cretaceous beds in New Jersey, and those in Nebraska, Arkansas, Texas, Alabama, &c., all to his *Senonien*, the equivalent of the White or Upper Chalk, and Maestricht beds.§

Prof. F. J. Pictet, in his "*Traité de Paléontologie*," also refers most, if not all, of the New Jersey Cretaceous species, to the age of the White Chalk of Europe.

In an interesting paper read by Dr. Isaac Lea before the Academy, in December, 1858, he likewise seems to favor the conclusion that the Cretaceous Green Sands of New Jersey represent the *Senonien* of D'Orbigny, but suggests some reasons for thinking that they may possibly belong a little lower in the Series.||

From a careful review of the whole subject, and an attentive study of extensive collections from the various formations of Nebraska, we are led to adopt D'Orbigny's views, so far as regards our Upper Cretaceous Series of that region, and their equivalents in New Jersey and the States farther south. That is to say, we regard these rocks as synchronous with the Upper or White Chalk, and Maestricht beds of Europe, (= *Senonien* of D'Orbigny.) We differ with him, however, in regard to the parallelism of our Lower Series of Nebraska; or, more properly, we differ with him in referring equivalent beds in Arkansas and farther south to his *Senonien*, for it is probable he had never seen any fossils from this Lower Series in Nebraska.

The evidence in favor of the conclusion we have adopted in regard to the synchronism of our Upper Series of Cretaceous rocks in Nebraska, with the White Chalk and Maestricht beds of Europe, is both of a stratigraphical and paleontological nature. The stratigraphical evidence is, that it holds, west of the Mississippi, a position above an older series, containing, as we have shown, a group of organic remains corresponding in their affinities, and in several instances, as we think, agreeing specifically with Lower Chalk forms in the old world. The paleontological evidence is, first, that many of its fossils belong to genera, which, according to Pictet, D'Orbigny, and others, are not known in Europe below the White Chalk, nor even, in some instances, below the oldest Tertiary. Secondly, that several of the forms occurring in these beds in Nebraska are also found in equivalent beds in New Jersey, and farther south, associated with well known European Upper Chalk and Maestricht bed species; while they are all specifically distinct, so far as known, from those found in the Lower Series in Nebraska.

The following is a list of the genera found in the Upper Series in Nebraska, and equivalent strata in New Jersey, Alabama, and some other States in the South; which, according to trustworthy authorities, are not known to range below the horizon of the White Chalk, and a few of them not even below the oldest Tertiary at foreign localities.¶

\* Jour. Acad. Nat. Sci., vol. iii., New Series, p. 217.—1841.

† Manual, p. 224.

‡ Report on the Geology of New Jersey, page 178.—1845.

§ Cours Elément. de Paléontologie, pages 671 and 672, vol. ii.—1852.

|| Proceed. Acad. Nat. Sci., Phila., Dec., 1858.

¶ A few other genera might probably be added to this list, but we have given what we consider the best authenticated examples.  
1861.]

Names of Genera.	Position in Nebraska.	Localities in the States.	Position in Europe.
Mosasaurus.	Ft. P.G. & Fox H. Bds.	N. Jersey and Alab.	Wh. Chk. & Maest. B.
Saurocephalus.		New Jersey.	White Chalk.
Callianassa.	Base Ft. Pierre Gr.	" "	" "
Pleurotoma.	Ft. P.G. Up. pt. & Fox H. B.		Wh. Chk. & Maest. B.
Busycon.	Fox Hills Beds.		
Pseudobuccinum.	" " "		
Fasciolaria.	" " "	Tennessee.	Maestr. Beds.
Cypræa.		Alabama.	White Chalk.
Xylophaga.	Fox Hills Beds.		
Pulvenites.		Mississippi.	" "
Cassidulus.		Alab. and Miss.	" "

Of this list of eleven genera, the following three, viz.—*Busycon*, *Pseudobuccinum* and *Xylophaga*, have not yet, we believe, been found in the old world so low as the Cretaceous; while the genus *Fasciolaria* is there said to extend no lower than the very latest member of the Cretaceous, (the *Danien* of D'Orbigny,) above the Maestricht beds. The following seven of these genera, viz.—*Callianassa*, *Busycon*, *Pleurotoma*, *Fasciolaria*, *Cypræa*, *Xylophaga*, and *Cassidulus*, pass into the Tertiary, and are represented in our present seas; while the genus *Pseudobuccinum* will probably be also found in the Tertiary, since we know at least one species of it still living.\*

At the same time that we are already aware of the occurrence of eleven or more genera, in our Upper Series of American Cretaceous rocks, not known to have been found below the horizon of the Upper Chalk in Europe, we can remember only three that have been identified in this Upper Series, which are supposed not to range above the Lower Chalk of the old world. These are *Caprinella*, *Gontomya*, and *Macrabacia*.† Of each of the latter two genera we certainly know one species in our Fox Hills beds; but the occurrence of the first in our Upper Series is very doubtful, since it has only been identified from a single imperfect specimen, that will probably be found to belong to some other group.

In addition to the general upward tendency, so to speak, of the genera in this Upper Series, both in Nebraska and farther eastward, we would also remark that a few of the forms found in our Fox Hills beds, particularly of the *Gasteropoda*, present such close specific affinities to Tertiary shells, that we would have doubted the propriety of referring them to the Cretaceous epoch, were it not for the fact that we find them associated in the same bed with *Baculites*, *Ammonites*, *Scaphites*, and other Cretaceous genera and species.

Although we have not been fully able to satisfy ourselves that any of the species yet known from the Upper Cretaceous Series of Nebraska are certainly identical with Upper Chalk forms in the old world, many of them are undoubtedly closely allied representatives, and we think the following will probably prove to be common to this horizon in Nebraska and Europe, viz.—*Nautilus Dekayi*, *Scaphites Conradi*, *Baculites anceps*, and *Gryphæa vesicularis*. At any rate *Nautilus Dekayi* is closely related to some foreign forms, and is supposed by D'Orbigny to occur in the Upper Chalk of Europe. *Scaphites Conradi*, also, seems scarcely distinguishable from an Upper Chalk form found in Germany, described by Roemer under the name of *S. pulcherrimus*; and we find in our Fox Hills beds a *Baculite* we cannot distinguish from a Texas shell referred by Dr. F. Roemer to *B. anceps* of Lamarck. We would remark, however, that if D'Orbigny's figures of Lamarck's species represent the sutures accurately, the Ame-

\* *P. ampullacum*, (= *Bullia ampullacea* of Middendorff,) from the Great Schantar-Island.

† We are aware the genus *Belemnites* is not known to extend up into the Upper Chalk in Europe, and that Dr. Morton described a *B. ambiguus* from New Jersey. Dr. Leidy, however, has decided that it is a spine of a Fish.

rican form will probably prove to be only an allied representative species. In addition to the above, we likewise find a *Gryphæa* in our Fort Pierre Group, which presents close relations to *G. vesicularis*, if it is not indeed that species.

When we come to the equivalent rocks further eastward, however, in New Jersey, and at localities in Alabama and other Southern States, we are no longer compelled, as previously stated, to rely upon doubtfully identical, or closely allied representative species, for we there find a number of our Nebraska forms associated with some seven or eight well known European Upper Chalk species.

So far as we have been able to ascertain, the list given below embraces the species known to be common to the New Jersey and Alabama rocks alluded to, and the Upper Chalk and Maestricht beds of the Old World :

Names.	American Localities.	Foreign localities and position.
<i>Saurocephalus lanciformis</i> ,	New Jersey.	England, White Chalk.
<i>Lamna acuminata</i> ,	New Jersey.	England, White Chalk.
<i>Belemnitella mucronata</i> ,	New Jersey, Ala., &c.	Eng., Fr., &c., Wh. Ck. & Maest. B.
<i>Neithea Mortoni</i> ,	New Jersey, Ala., &c.	France, White Chalk.
<i>Ostrea larva</i> ,	N. J., Tenn., Ala., &c.	Eng., France, &c., Wh. Ck. & Maest. B.
<i>Gryphæa vesicularis</i> ,*	N. J., Tenn., Ala., &c.	Eng., France, &c., Wh. Ck. & Maest. B.
<i>Nucleolites crucifer</i> ,	New Jersey.	France, White Chalk.

It is true we have in this upper series in Nebraska and further east, a few forms allied to Lower Chalk and Upper Green Sand species, and we have regarded two of these, at least, as probably identical with foreign species of that age. That is, we had supposed our *Cucullæa Shumardi* probably identical with the Green Sand species, *C. fibrosa* of Sowerby, and a small *Micrabacia* from our Fox Hills beds, probably identical with *M. coronula* Goldfuss sp., from the same horizon. Later comparisons, however, have led us to regard the latter as a distinct species; and although we have not yet been able to find characters by which our *Cucullæa Shumardi* can be distinguished from the figures and descriptions of Sowerby's species we have seen, it is quite probable that a careful comparison of a series of good specimens would bring to light constant differences of specific importance. Should these, however, and several others we have from time to time compared with Green Sand and Lower Chalk species, really prove to be undistinguishable from them, still the weight of evidence would, on the whole, be strongly in favor of the conclusion that these rocks are certainly of the age of the Upper Chalk and Maestricht beds.

From all the foregoing facts it may be seen, first, that the only strongly marked palæontological break in the Nebraska Cretaceous Section, so far as we now know, is that dividing the Niobrara Division from the Fort Pierre Group.

Secondly, That all the Nebraska Cretaceous beds below this line, included in our section, as well as the bed f. of the New Jersey Section, on page 426 of this paper, represent the Lower or Gray Chalk, are probably the Upper Green Sand of the Old World.†

Thirdly, That all the Nebraska beds between this strongly marked line, near the middle of the section, and the Tertiary, as well as the beds b, c, d,

\* This species is supposed by some to occur also in the Upper Green Sand, and the Lower or Gray Chalk, but the form occurring in these lower positions is regarded by other authorities as a distinct species.

† By this remark we do not mean to express the opinion that Cretaceous strata older than the Upper Green Sand of Europe may not exist, and yet be discovered in Nebraska and New Jersey.

and e, of the New Jersey Section, belong to the horizon of the Upper or White Chalk and Maestricht Beds of Europe.

### TERTIARY ROCKS.

It would extend these remarks beyond the limits assigned them, to attempt any detailed account of the Tertiary rocks of Nebraska, or to discuss at length the questions respecting their relations to those of the Atlantic coast, or of the Old World. We must therefore limit ourselves here to a few brief statements of leading facts, and leave all details for another occasion.

In the first place, we would remark, that no strictly marine Tertiary deposits have yet been discovered in all the Rocky Mountain region of Nebraska, nor, so far as we know, in any other portion of Nebraska, Kansas or Utah. Throughout all this great central area of the Continent, wherever the oldest Tertiary deposits have been seen, they give evidence of fresh and brackish water origin; and where observed resting upon the most recent Cretaceous beds, the two have been found conformable, and sometimes blended together, so as to render it difficult to draw a line between them, in the absence of organic remains.

All the facts indicate a gradual change from the marine conditions of the Cretaceous—at first to brackish, and then to the fresh water conditions of the Tertiary. The predominance of *Gasteropoda* and *Lamellibranchiata*, and the comparative paucity of types usually considered characteristic of deeper water deposits, as well as the coarser nature of the sediments, near the end of the Cretaceous epoch in this region, indicate that the waters were growing more shallow as the land on the east encroached on the sea, and islands were rising where the Rocky Mountains now stand; while the close of the Cretaceous period seems to have been attended by the gradual elevation of large areas of country here above the ocean level. This and other contemporaneous changes of physical conditions, caused the total destruction of the whole Cretaceous fauna.

After this, extensive tracts of country in the region of the Rocky Mountains, and east of there in Nebraska, and other North-western Territories, were occupied by Bays, Inlets, Estuaries, &c., of brackish water, inhabited by mollusca of the genera *Ostrea*, *Unio*, *Pisidium*, *Corbicula*, *Potamomya*, *Melania*, *Melampus*, *Vivipara*, &c. &c., all of Tertiary types. As the gradual elevation of the country continued, the salt and brackish waters receded, and gave place to Lakes and other bodies of fresh water, in which most of the Tertiary rocks of the North-west were deposited; so that in all, excepting the earliest Tertiary beds of this region, we find only the remains of strictly fresh water and terrestrial animals.

The passage from the brackish to the fresh water beds in the oldest member of the Tertiary of this region, seems not to be marked by any material alteration in the nature of the sediments. Nor have we, so far as is yet known, any reasons for believing that any climatic or other important physical changes beyond the slow rising of the land, and the consequent recession of the salt and brackish water, took place during the deposition of the whole of the oldest member of the Tertiary here; since we find a considerable proportion of the species of fresh water mollusca ranging through this whole lower member. The principal difference between the fossils of its upper and lower beds, consists in the gradual disappearance of strictly brackish water types, as we ascend from the inferior strata.

The entire series of Nebraska Tertiary rocks consists of three or four groups, three of which at least, (and probably four), evidently belong to separate and distinct epochs. They usually occur in isolated basins, but have with one exception, all been seen in such connection as to leave no doubts in regard to their order of superposition. Their prevailing lithological characters, estimated maximum thickness, and order of succession, will be seen in the section given below.

## General Section of the Tertiary rocks of Nebraska.

Names.	SUBDIVISIONS.	Thick-ness.	LOCALITIES.	Foreign Equiva-lents.
Loup River beds.	Fine loose sand, with some layers of limestone,—contains bones of <i>Canis</i> , <i>Felis</i> , <i>Castor</i> , <i>Equus</i> , <i>Mastodon</i> , <i>Testudo</i> , &c., some of which are scarcely distinguishable from living species. Also <i>Helix</i> , <i>Physa succinea</i> , probably of recent species. All fresh water and land types.	300 to 400 feet.	On Loup fork of Platte River; extending north to Niobrara River, and south to an unknown distance beyond the Platte.	Pliocene.
White River Group.	White and light drab clays, with some beds sandstone, and local layers limestone. Fossils, <i>Oreodon</i> , <i>Titanotherium</i> , <i>Charopotamus</i> , <i>Rhinoceras</i> , <i>Anchitherium</i> , <i>Hyaenonodon</i> , <i>Machairodus</i> , <i>Trionyx</i> , <i>Testudo</i> , <i>Helix</i> , <i>Planorbis</i> , <i>Limnæa</i> , Petrified wood, &c. &c. All extinct. No brackish water or marine remains.	1000 feet or more.	Bad Lands of White River; under the Loup River beds, on Niobrara, and across the country to the Platte.	Miocene.
Wind River Deposits.	Light gray and ash colored sandstones, with more or less argillaceous layers. Fossils, — fragments of <i>Trionyx</i> , <i>Testudo</i> , with large <i>Helix</i> , <i>Vivipara</i> , Petrified wood, &c. No marine or brackish water types.	1500 to 2000 feet.	Wind River valley. Also west of Wind River Mountains.	?
Fort Union or Great Lignite Group.	Beds of clay and sand, with round ferruginous concretions, and numerous beds, seams and local deposits of Lignite; great numbers of dicotyledonous leaves, stems, &c. of the genera <i>Platanus</i> , <i>Acer</i> , <i>Ulmus</i> , <i>Populus</i> , &c., with very large leaves of true fan <i>Palms</i> . Also, <i>Helix</i> , <i>Melania</i> , <i>Vivipara</i> , <i>Corbicula</i> , <i>Unio</i> , <i>Ostrea</i> , <i>Potamomya</i> , and scales <i>Lepidotus</i> , with bones of <i>Trionyx</i> , <i>Emys</i> , <i>Compsemys</i> , <i>Crocodylus</i> , &c.	2000 feet or more.	Occupies the whole country around Fort Union, — extending north into the British possessions, to unknown distances; also southward to Fort Clark. Seen under the White River Group on North Platte River above Fort Laramie. Also on west side Wind River Mountains.	Eocene ?

THE FORT UNION, OR GREAT LIGNITE GROUP, occupies extensive areas of country in Nebraska, and has been seen beneath the White River Group at several distant localities. It was evidently deposited in large bodies of water, which were at first brackish, and then gradually became fresh. The great numbers of fossil leaves, and numerous beds of lignite contained in it, clearly show that the shores of these ancient estuaries, lakes, &c., in which this formation was deposited, supported dense forests of large trees, and a growth of other vegetation, far exceeding in luxuriance anything now met with in these latitudes. Indeed, the presence of true Fan Palms, of large size, and 1861.]

the remains of the genus *Crocodylus*, as well as the affinities of the mollusca found in these beds to southern forms, all point rather to the existence here of a tropical than a temperate climate during their deposition.

In regard to the relations of this formation to known horizons in the Tertiary of the Old World, we scarcely feel prepared to express a very decided opinion. The difficulty in the way of drawing inferences bearing on this point, from the remains of mollusca found in these beds, is, that they, being fresh and brackish-water types, bear little or no analogy to those of the Tertiaries of the States bordering on the Atlantic; nor are any of them, so far as known, specifically identical with foreign forms.

When we bear in mind, however, the fact, that wherever this formation has been seen in contact with the latest Cretaceous beds, the two have been found to be conformable, however great the upheavals and distortions may be, while at the junction there seems to be a complete mingling of sediments, one is strongly impressed with the probability that no important member of either system is wanting between them. This view is also rendered more probable by the fact that the formation under consideration is known to hold a position beneath the White River Group; which is characterized by the remains of an entirely different fauna, clearly of Miocene age.

Again, the occurrence in this lower group of remains of the genus *Lepidotus*, which is, we believe, in Europe unknown above the Eocene; while the other vertebrate remains found associated with it have been compared by the distinguished Comparative Anatomist, Prof. Leidy, with types even older than the Tertiary, are facts strengthening the impression that this Fort Union Lignite Group probably represents the Eocene of Europe.

It should not be forgotten, however, that an extensive and beautiful series of fossil plants from this formation, although not yet thoroughly investigated, have been thought by Dr. Newberry to be most analogous to Miocene types. Yet even if this formation should prove to be of Eocene age, this would only be in accordance with what is now known in regard to the earlier introduction of particular types of plants in the Cretaceous System of this country, than in that of the Old World.

As the WIND RIVER DEPOSITS have not yet been seen in contact with any well marked beds of the other Tertiary formations of this region, and few fossils have yet been found in them, their position in the series remains doubtful. It is therefore only provisionally that we have placed this formation between the Fort Union and White River Groups in the foregoing section. It may possibly belong to the horizon of one of these rocks, or even represent them both in part, or, what is more probable, it may occupy an intermediate chronological position.

The only fossils yet found in this formation are fragments of *Trionyx*, and *Testudo*, together with the shells of two species of *Helix* and a cast of a *Vivipara*. One of these *Helices* is more like *H. Leidyi*, from the White River Group than any of the other species yet known from any of these rocks, while the other is a very large depressed species of southern type, quite unlike any of those hitherto found in any of the other Nebraska rocks. The *Vivipara* seems to be undistinguishable from our *V. trochiformis*, from the Fort Benton Group; though, as it is a mere cast, it cannot be identified with positive certainty with that shell. No marine or brackish water fossils have been found in these beds.

THE WHITE RIVER GROUP is the formation that has furnished the extensive and interesting collections of vertebrate remains, which have been so ably investigated by Prof. Leidy. It occupies a considerable area in the region of White River, and is seen beneath the succeeding formation on the Niobrara and Platte Rivers. Its position above the Fort Union, or Great Lignite Group, has also been clearly and satisfactorily determined.

This formation is mainly composed of a series of whitish indurated clays, which have been worn and cut by the streams, rains, and other atmospheric

agencies, into numerous deep valleys and ravines, so as to leave various peaks, isolated columns, towers, &c., presenting, as seen from a distance, exactly the appearance of the ruins of an ancient city. The difficulty the traveller meets with in finding his way through this interminable labyrinth, had caused the Indians to call it in their own language, the Bad Grounds, hence the French name *Mauvaises Terres*, applied by the Canadian Voyageurs in the employ of the Fur Companies.

The vertebrate remains found in these beds belong to the genera *Oreodon*, *Agriochærus*, *Pebrotherium*, *Leptomeryx*, *Leptauchenia*, *Protomeryx*, *Merycodus*, *Titanotherium*, *Leptochærus*, *Hyracodon*, *Entelodon*, *Palæochærus*, *Rhinoceros*, *Stenofiber*, *Machairodus*, *Anchitherium*, *Hypotamias*, *Hycanodon*, *Ischyromys*, *Palæolagus*, and *Emmys*, *Testudo*, &c., &c. The affinities of these fossils, as has been shown by Prof. Leidy, clearly establish the Miocene age of this formation.

Comparatively few invertebrate remains have yet been found in the White River Group. They consist of one species of *Helix*, one or two of *Limnæa*, a small *Physa*, two or three small species of *Planorbis*, &c. No fossil leaves, nor beds of Lignite, have been met within it; and all the animal remains, as may be seen from the foregoing list, are terrestrial and fresh water types.

The LOUP RIVER BEDS consist mainly of incoherent materials, and were evidently deposited after the upper surface of the White River Group had been worn into ravines and other depressions. It occupies much of the surface of the country in the region of the Loup Fork of Platte River, and extending far south of the latter stream. The vertebrate remains described by Prof. Leidy from it, belong to the genera *Megalomeryx*, *Procamelus*, *Cervus*, *Rhinoceros*, *Mastodon*, *Elephas*, *Hipparion*, *Merychippus*, *Equus*, *Castor*, *Felis*, *Canis*, *Testudo*, &c., many of which are very closely allied to recent species. A few shells of the genera *Helix*, *Physa*, &c., apparently identical with living species, have also been found in these beds. All the species of vertebrate and other remains yet found in them, are distinct from those occurring in the White River Group and beds below, and they have not yet afforded any brackish or marine types of any kind.

When we take into consideration the position of this formation above the well marked Miocene White River Group, and the relations of its organic remains to Pliocene and recent species, there is little room for doubting the correctness of its reference to the horizon of the Pliocene of Europe.

## SILURIAN (PRIMORDIAL) FOSSILS.

### BRACHIOPODA.

#### Genus OBOLELLA, Billings.

##### OBOLELLA NANA.

Shell very small, subcircular, or transversely suboval, moderately convex, rather thick; front broadly rounded; sides more narrowly rounded. Beak of dorsal valve short and obtuse. Ventral valve proportionally a little longer than the other, about as long as wide, and having a slightly more prominent beak; without a distinct mesial ridge within; scars of adductor muscles? located behind the middle and diverging towards the front. Surface marked by a few concentric furrows; exfoliated specimens showing small, obscure, regularly disposed radiating striæ on the inner laminae.

Length of dorsal valve, 0.15 inch; breadth of do., 0.17 inch; convexity, 0.15 inch. Length and breadth of ventral valve of a smaller specimen, each 0.14 inch.

In first sending on to the Academy a description of this little shell, we had referred it with doubt to the genus *Obolus*, stating, at the same time, that its muscular scars, so far as they could be made out from the only specimen we 1861.]

had seen showing the interior, seemed to present differences from the type of Echwald's genus. Since seeing Mr. Billings's figures of his genus *Obolella*, recently published, we are fully satisfied that he is right in separating these shells from the genus *Obolus*.

Our species is so closely allied to *Obolella chromatica* of Billings, the type of the genus, (see "New species of Lower Silurian Fossils," page 7,) that we were inclined to regard it as specifically identical, until we had an opportunity to compare it with specimens of Mr. Billings' species, kindly sent us by him. On comparing it with these, we find it is more convex, and proportionally broader, while its concentric markings are stronger. The substance of its shell is also thicker, and differs in showing radiating striæ on the inner laminae of exfoliated specimens.

*Locality and position.* Central portions of the Black Hills, from the Primordial or Potsdam Sandstone.

### PTEROPODA?

Genus THECA, Morris.

THECA (PUGIUNCULUS) GREGAREA.

Shell small, straight, acutely conical; dorsal side compressed or nearly flat; ventral side regularly rounded; lateral margins obtusely subangular, and converging regularly, at an angle of about  $18^{\circ}$  to the pointed lower extremity; aperture nearly semicircular, or forming rather more than half a circle; surface smooth.

Length, 0.45 inch; breadth, 0.15 inch; convexity, 0.10 inch at the aperture.

This frail little shell must have existed in vast numbers, since on a single slab not more than six by eight inches across, we have counted near two hundred individuals. It resembles in form *Pugiunculus striatulus*, of Barrande, (Neues Jah. p. 554, pl. 9, fig. 2,) but differs in being very much smaller, and much more convex and straighter on the ventral side; as well as in being destitute of striæ. It agrees more nearly in size, and the smoothness of its surface, with *P. simplex*, of the same author, but is smaller, and differs in having its lateral margins straight instead of concave in outline. Its ventral side is also much more convex, and more rounded.

In size and form it is much more nearly like *Salterella obtusa*, of Billings, (New sp. Lower Sil. Foss., p. 18;) but it seems to differ in not being composed of successive layers, as in that species and genus. We only place it provisionally in the genus *Theca*.

*Locality and position.*—Near the head of Powder River, in Big Horn Mountains. From Primordial or Potsdam Sandstone.

### TRILOBITES.

Genus ARIONELLUS, Barrande.

ARIONELLUS (CREPICEPALUS) OWENI.

Head forming more than a semicircle, or nearly semielliptic in outline, its length equalling about two-thirds its breadth, rather distinctly convex; posterior border more or less concave in outline, and provided with a deep rounded marginal groove along each lateral slope. Glabella rather gibbous, elevated above the cheeks, oblong-subovate, its lateral margins converging with a slight convexity towards the front, which is rounded; greatest convexity near the middle and posteriorly, separated from the cheeks on each side and in front, by a distinct sulcus; neck furrow passing entirely across, but slightly deeper on each side than at the middle; lateral grooves three, very short, obscure, or (in casts) nearly obsolete, not oblique. Cervical segment somewhat

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rounded, a little convex on its posterior outline; less elevated than the glabella. Anterior slope in advance of the glabella, less than half as wide as the length of the latter, and provided with a distinct, rounded transverse furrow, which passes around slightly in front of the middle of this space parallel to the anterior and lateral margins. Cheeks convex, and sloping towards the lateral and antero-lateral border. Surface and facial sutures unknown.

Length, measuring from the posterior side of the neck segment to the front margin, 0.57 inch; greatest breadth measuring across at the posterior extremities of the cheeks, 0.87 inch; height, 0.31 inch. Length of glabella, including the neck segment, 0.40 inch; breadth of glabella, 0.35 inch.

The only specimen of this species we have seen is a cast, retaining none of the shell, and of course giving no idea of the nature of the external markings, if there were any. Nor is it in a condition to enable us to determine whether or not the posterior lateral extremities of the buckler are pointed, though they appear to be. At a point nearly opposite the middle of the glabella, there is on each cheek less than half way down the slope, from the furrow between the cheeks and the glabella, what appears to be some remains of a small eye, though the specimen being unfortunately a little defective here on both sides, the exact nature of these prominences cannot be clearly made out.

We sent drawings of this species to Dr. Shumard and Mr. Billings, both of whom write that it is specifically distinct from any of the forms described by them from rocks of the same age in Canada and Texas. We had been inclined to refer it to Mr. Billings' genus *Bathyurus*, but have concluded to place it provisionally in Barrande's genus, *Arionellus*, until better specimens can be obtained, showing more satisfactorily its generic characters. We have been led to do this, by the proportionally small size of some imperfect caudal shields, probably of the same species, embedded in the same slab; in which respect it would seem to agree more nearly with Barrande's genus, than with *Bathyurus*, the type of which, Mr. Billings writes, has a caudal shield nearly one-third as large as the entire animal.

Both of these genera seem to be very closely allied to *Crepicepalus* of Owen, but as that genus is not very clearly defined, and was based upon specimens probably belonging to more than one group, it will perhaps not be generally adopted. Our species is certainly quite closely allied to some of the specimens figured by Dr. Owen under that name.

*Locality and position.*—Same as last.

## JURASSIC SPECIES.

### LAMELLIBRANCHIATA.

Genus GRYPHÆA, Lamarck.

GRYPHÆA CALCEOLA, var. NEBASCENSIS.

*Gryphæa calceola*, Quenstedt, Handb. Petref. tab. 40, fig. 29-31.

*Gryphæa calceola*, Quenstedt, Der Jura, tab. 48, fig. 1-3.

*Gryphæa calceola*? Meek, Capt. Simpson's Rept. Utah Expedition.

Amongst the collections brought in by Capt. Simpson's Expedition, from the Jurassic beds at the Red Buttes, on the North Branch of the Platte River, there are specimens of a small irregular oyster-like *Gryphæa*, which were referred with doubt by one of the authors to *Gryphæa calceola*, of Quenstedt. These specimens generally have the whole umbo completely truncated by the scar of attainment, so as to present none of the characteristic features of the genus *Gryphæa*. Some of them, however, have the beak less distinctly truncated, and a few have it nearly entire, pointed, and incurved as in the true *Gryphæas*. Still none of these specimens are one-fourth as large, nor have any of

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them the beak anything like near so strongly incurved as Quenstedt's fig. 1, tab. 48, of his *Der Jura*.

Amongst the specimens now under consideration, belonging to Capt. Reynolds' collections, from the Jurassic beds at Big Horn, Mountain Lat.  $43^{\circ} 30' N.$ , Long. 108 West, we have a large series agreeing in nearly all respects with the forms brought in by Capt. Simpson. Most of them would be called true oysters, were it not for the fact that we find them occasionally shading into *Gryphæa*-like forms.

From another locality at the base of the mountains near the head of Wind River Valley, a large number of specimens were obtained by Capt. Reynolds' expedition, from the same horizon as those mentioned above, (and associated with the same group of fossils,) nearly all of which present the form, and all the characters of true *Gryphæas*, and appear to agree very closely with Quenstedt's fig. 1, on the plate above cited. Whether or not all these Nebraska forms should be included in one species, as Quenstedt has done with the German specimens, is an exceedingly difficult question to decide; nor can we determine very satisfactorily without authentic European specimens for comparison, whether or not our group of forms are really in all respects identical with those figured by Quenstedt. Until these questions can be determined from more satisfactory data than we now have at our command, we would propose to designate the narrow shells with a distinctly incurved umbo from Wind River Valley, as *Gryphæa calceola*, var. *Nebrascensis*, since they may possibly be distinct from Quenstedt's species.

These latter may be described as follows:—lower valve very narrow, elongate, arcuate, in old individuals thickened near the umbo, and provided with an obscure sulcus from near the beak along near the anterior side to the ventral margin; beak slender, distinctly incurved, and directed a little obliquely towards the front, often rather pointed, but sometimes slightly truncated at the apex; area triangular, arcuate, extending close up under the curve of the beak, and provided with a shallow mesial depression; muscular scar small, shallow, oval, and located near the left or anterior side, surface ornamented on the gibbous back of the umbo by distinct, irregular, radiating striæ, usually extending to near the middle, on mature specimens, while the space between this and the ventral margin is marked only by moderately distinct concentric striæ, and stronger ridges of growth.

Upper or smaller valve ovate, nearly flat on the outside, or a little convex at the beak, and more or less concave near the middle, usually concave within towards the cardinal extremity, which is truncated and thickened; surface ornamented with rather distinct marks of growth.

Length from the most prominent part of the umbo, to the ventral extremity, 2.70 inches; breadth at the extremity opposite the beak, about 1.20 inch; convexity, 0.73 inch.

The most marked features of this shell of which we have before us more than one hundred specimens, are its slender form, and the distinctly striated character of the umbonal region of its lower valve. Its greatest breadth is at the ventral extremity, from which it narrows gradually towards the beak, the anterior side being a little more expanded than the other, and in the lower valve somewhat lobed in front of the sulcus extending from near the beak to the ventral margin. The radiating striæ on the umbonal region of the under valve seem to have commenced almost with the growth of the shell, and continued until it had obtained nearly half its full size, after which only concentric markings were developed.

No one could for a moment confound any of the forms we have been describing with *G. Pitcheri*, (= *G. dilatata* of Marcou, not of Sowerby), even after merely glancing at the specimens. None of those having the beak pointed and incurved are ever one-half as broad, or deep in proportion to their length as that shell, while they differ entirely in their surface striæ. In short, they all differ as widely from that shell as any two species of the genus can perhaps

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differ from each other. In addition to this, they hold a widely different geological position, and are associated with an entirely different group of fossils, all of which are clearly Jurassic forms. We mention these facts because Mr. Marcon has expressed the opinion that the specimens in Capt. Simpson's collections, referred by one of the authors with doubt to *G. calceola*, are nothing more than the form he has referred to *G. dilatata*, an opinion he would not have for a moment maintained, if he had seen the specimens alluded to.

*Locality and position.* Head Wind River Valley, at base of the mountains. Jurassic.

Genus MODIOLA Lamarck.\*

MODIOLA (PERNA) FORMOSA.

Shell narrow, subelliptical, moderately arcuate, gibbous along the umbonal slopes, the greatest convexity being near the middle of the valves; anterior end rather narrowly rounded; base sinuous near the middle, or a little behind it, and rounding up rather abruptly in front; dorsal margin a little arching back to near the middle of the shell, thence becoming obtusely carinate, and declining with a long gentle curve to the posterior extremity which is very narrowly rounded; beaks small, compressed, obtuse, and located directly over the anterior margin, beyond the rounded outline of which they scarcely project; umbonal slopes prominently rounded, and extending from the beaks obliquely backwards to the posterior extremity. Surface ornamented by small concentric striæ, and a few stronger marks of growth, which are crossed on the dorsal half of the valves by about forty or fifty regular, closely arranged, and generally simple radiating lines, extending from the beaks to the postero-dorsal and anal margins; faint traces of another system of extremely fine striæ may also be seen, by the aid of a magnifier, crossing the somewhat compressed ventral half of the valves, from the umbonal ridge to the basal margin.

Length, 2.05 inches; diameter from the ventral to the dorsal margins, at right angles to the length, near the middle of the shell, 0.84 inch; greatest convexity at the same point, 0.80 inch.

This shell is very closely allied to the European Jurassic, *Modiola cancellata*, (= *Mytilus cancellatus* of Goldfuss.—Petrefact. Germ., Tome ii. pl. 131, fig. 2), and may possibly prove to be identical, when we can have the means of making direct comparisons with authentic specimens of the latter. The five Nebraska specimens, however, now before us, all present the following differences from Goldfuss' figure. In the first place, they are narrower across from the dorsal to the ventral side, more narrowly rounded at the posterior extremity, and have slightly more prominent beaks, while their antero-ventral margin is a little more convex, and their base rather more arcuate. Their surface markings are very similar to those of Goldfuss' species, though his enlarged figure represents the concentric striæ crossing the radiating lines, as being more distinct and regular than on our shell. He also neither figures nor mentions in his description the fine obscure transverse striæ seen on the ventral half of the Nebraska shell, though these are so indistinct that they might be easily overlooked; indeed they seem rather to be in some way dependent upon the structure of the shell rather than really surface markings.

M. Alcide D'Orbigny cites *Modiola cancellata* of Rømer, and his own *M. Strajeskiana* from the Jura of Russia, as synonymous with *M. cancellata* of Goldfuss. Without expressing a positive opinion on this point, we would remark, that this seems very improbable to us, unless Goldfuss' species is exceedingly variable. At any rate, Rømer's and D'Orbigny's figures are very unlike our Nebraska shell, which is remarkably uniform in its characters.

*Locality and position.* Big Horn Mountains. Jurassic.

\*The name *Modiola*, Lamarck, will probably have to give way to *Perna*, Adanson (non Bruguiere), or *Volsella scopoli*.

## CRETACEOUS SPECIES.

## LAMELLIBRANCHIATA.

Genus OSTREA Linnæus.

## OSTREA GABBANA.

Shell rather small, thin and longitudinally elliptical or ovate; cardinal margin narrowly rounded, or subangular at the beaks; opposite extremity rounded; anterior and posterior sides forming regular elliptic curves; surface of both valves smooth, excepting obscure marks of growth. Lower valve rounded below, and rather deeply concave within; beak small, not very prominent; area small, wider than long. Upper valve perfectly flat, nearly smooth, and presenting the same outline as the other, excepting that its beak is rather less prominent; area short and a little thickened.

Length from beaks to the opposite extremity, 1.36 inches; diameter from the anterior to the posterior side, 1 inch; convexity or depth of the lower valve, 0.30 inch.

This shell presents an unusual regularity of form for an oyster, and is not liable to be confounded with any other species with which we are acquainted. The regular elliptic outline and uniform convexity of the lower valve, with its small beak, ranging exactly in a line with its longer central axis, give it, as seen from below, much the appearance of some smooth species of *Terebratula*, such as the *T. Harlani* of Morton. The specimens vary little in form, the only difference being the rather less elongate outline of young individuals.

Named in honor of Mr. Wm. M. Gabb, of Philadelphia.

*Locality and position.* Head Gros-ventres River, from a gray sandstone containing *Cardium curtum* (of this paper), a large nearly circular *Inoceramus*, and an *Oyster* of undetermined species. The age of this rock is not very clearly determined but is most probably Cretaceous.

Genus LEDA Schumacher.

## LEDA BISULCATA.

Shell small, transversely subovate; gibbous in the central region; anterior side narrowly rounded; base semi-elliptical, with a slight sinuosity near the posterior extremity; anal end narrow and subangular in outline; dorsal border sloping from the beaks at an angle of about 135°; beaks rather obtuse, nearly central, or located slightly in advance of the middle; posterior umbonal slopes distinctly angular, the angles extending back to the anal extremity, where they terminate in a small obscure fold; escutcheon lanceolate, concave along the middle, and strongly defined by the umbonal angles, just within which there is on each side a narrow well defined sulcus, extending from the beaks to the posterior end of the shell; lunule not defined; surface ornamented by small, rather distinctly elevated, regularly arranged concentric striæ.

Length, 0.31 inch; height, 0.16 inch; convexity, 0.13 inch.

At a first glance, this little shell might be mistaken for our *Leda*, (*Yoldia*), *scitula* (= *Nacula scitula* Ap. 1856, Proceed. Acad. Nat. Sci., Phila., p. 84); but on a closer examination, it will be at once distinguished by its angular posterior umbonal slopes and distinctly defined escutcheon, as well as by its stronger concentric striæ. It is also a little less gibbous and slightly more depressed.

*Locality and position.* Deer Creek, near North branch Platte River, in lower part Fox Hills beds, or the upper beds of Fort Pierre Group of the Nebraska Cretaceous Section.

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## Genus GERVILLIA, DeFrance.

## GERVILLIA RECTA.

Shell small, rather thin, obliquely elongate-oblong; antero-basal margin nearly straight, or slightly convex in outline; postero-dorsal border parallel to the under margin; anal extremity rounded or subtruncate; hinge comparatively short, terminating in an acute angle in front, and ranging at an angle of thirty to thirty-five degrees above the oblique longitudinal axis of the shell; cardinal area scarcely gaping, provided with three small cartilage pits; beaks small, very oblique, placed about half way between the middle and the anterior extremity of the hinge; surface smooth, or only marked with fine obscure striæ of growth. Left valve convex, but flattened along the middle, so as to give the shell a cuneate appearance posteriorly, and produce an obscure ridge along the upper and lower margins of the flattened portion; above the upper of these ridges, the posterior portion of the hinge is strongly compress or subalate. Right valve flat.

Length, measuring from the posterior extremity obliquely forward to the anterior end of the hinge, 2 inches; breadth, at right angles to the length, 0.66 inch; convexity, 0.30 inch; length of hinge, 0.81 inch.

This little shell is closely allied to a lower green sand species described by Prof. Forbes under the name of *Gervillia linguloides*, (Qr. Jour. Geol. Soc. Lon., vol. 1, pl. 3, fig. 9.) So close indeed is the resemblance, that were it not for the fact that our shell holds a position near the upper part of the Cretaceous system, and comes from so widely distant a locality, we should scarcely venture to regard it as a new species. The most important difference between it and Forbes' species is in the position of its beaks, those of *G. linguloides* being described as terminal, while in our shell they are placed about half way between the middle and the anterior extremity of the hinge. It is true, D'Orbigny refers to *G. linguloides*, (Pal. Fr. Ter. Cret., Tome 3, pl. 396,) a form which has its beaks not quite terminal, though they are distinctly nearer so than those of our species. In other respects D'Orbigny's figures agree almost exactly with the specimens before us, excepting that they represent the shell as being laterally arcuate, while ours is invariably straight. His figures, as well as Prof. Forbes', are also more narrowly rounded at the postero-basal extremity than any of the specimens of the form under consideration. All our specimens are proportionably narrower, and more elongate than Prof. Forbes' figures, though not more so than D'Orbigny's.

*Locality and position.*—Same as last. Very numerous.

## Genus CRENELLA, Brown.

## CRENELLA ELEGANTULA.

Shell small, very thin and pearly, obliquely ovato-cordate, ventricose; postero-basal and basal margins rounded; dorsal border sloping posteriorly with an arcuate outline, and rounding into the anal margin behind; anterior border rounding obliquely backwards into the base; umbonal region of both valves very gibbous; beaks prominent, terminal, pointed, distinctly incurved and directed obliquely forward at the extremities; hinge margin smooth; free border minutely crenulated. Surface (as seen by the aid of a magnifier) beautifully ornamented by extremely fine, regular, closely-arranged, radiating striæ, which increase chiefly by bifurcation, and continue of uniform size on all parts of the shell; crossing these are numerous equally fine, but much less distinct, concentric lines, and occasional stronger marks of growth.

Length, measuring obliquely forward and upward from the base to the beaks, 0.55 inch; diameter, from base to hinge, measuring at right angles to the greatest length, 0.40 inch; convexity, 0.37 inch.

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This beautiful little shell is very closely allied to *C. sericea* of Conrad, (Jour. Acad. Nat. Sci., Phila., New Series, vol. 4, page 281, pl. 46,) but differs in being uniformly more broadly ovate in form, and in having less elevated and less distinctly incurved beaks, while its concentric markings are not near so strongly defined.

*Locality and Position.*—Same as last. We also have a fragment of apparently the same species from the Yellow Stone River, in upper part Fort Pierre Group.

Genus *CARDIUM*, Linnæus.

*CARDIUM (HEMICARDIUM?) CURTUM.*

Shell trigonal, gibbous, closed; anterior side more or less rounded; posterior side distinctly truncated and transversely flattened; base forming an elliptic curve; postero-basal extremity angular; hinge very short; beaks elevated, pointed, distinctly incurved, and a little oblique at the immediate points; posterior umbonal slopes prominent and angular from the beaks to the base. Surface ornamented by about forty five regular, distinct radiating costæ, usually a little wider than the deep grooves between, and always simple on the gibbous portion of the valves, but apparently sometimes bifurcating on the truncated posterior side. (Hinge teeth unknown.)

Height, 1.74 inch; breadth, 1.80 inch; convexity, 1.30 inch.

This is a peculiar shell, not liable to be confounded with any other species with which we are acquainted. It seems to form a connecting link between the singular group *Hemicardium* and the true typical *Cardiurms*; being one of the many instances met with in the study of fossil species of a form connecting groups which in our existing fauna appear to be separated by rather marked differences.

*Locality and position.*—Head Gros Ventres River, where it occurs with a large *Inoceramus* in a gray sandstone, probably of Cretaceous age. Fragments of apparently the same *Cardium* were brought by Capt. Simpson's Expedition from a yellow sandstone near Bear River, Utah.

*CARDIUM PERTENUE.*

Shell rather small and very thin, broad ovate in form, its height being greater than its length, very ventricose; anterior and basal margins regularly rounded; posterior side subtruncate; hinge margin short; beaks elevated, gibbous, distinctly incurved, and very nearly central; posterior umbonal slopes prominently rounded. Surface ornamented by fine lines of growth and a few concentric wrinkles near the free border; on the posterior half of the valves there are also some fifteen to twenty nearly obsolete radiating costæ, which impart to the posterior and postero-basal margins a distinctly crenulated outline.

Height, 0.64 inch; diameter, from the anterior to the posterior margin, 0.59 inch; convexity, 0.50 inch.

This species is of the same type as *Cardium subquadratum* and *C. rarum* of Evans and Shumard, (Trans. Acad. Sci., St. Louis, vol. 1, p. 39); from both of which it may be at once distinguished by its much more elevated beaks and greater height in proportion to its length. These three species belong to a small group having close relations to *Protocardium*, being concentrically striated or nearly smooth on the anterior half of the shell, with faint indications of radiating costæ behind. These markings, however, are not so distinct and regular as on the typical species of *Protocardium*; the concentric striæ being merely very fine, obscure lines of growth, and the plications often almost entirely obsolete.

*Locality and position.*—Deer Creek, near the North Branch of Platte River, from the upper part of the Fort Pierre Group, or the lower part of the Fox Hills Beds.

## Genus CALLISTA, Poli.

## CALLISTA DEWEYI.

*Cytherea Deweyi*, M. and H., 1856, Proceed. Acad. Nat. Sci., Phila., p. 83.

*Meretrix Deweyi*, M. and H., 1860, " " " " " p. 185.

We have recently had an opportunity to examine some specimens of this species, exhibiting the hinge and other internal characters which we had not previously seen. These show that it cannot properly go into the genus *Meretrix*, (*Cytherea*), as that group is now restricted by those conchologists who take as its type such forms as *M. impudica*, but that it possesses the characters of *Callista*, Poli, (*Dione*, Gray,) to which we now remove it.\*

The collections recently brought in from a locality on Deer Creek, a tributary of the North Branch of Platte River, contain a large number of specimens apparently of the above species, in a fine state of preservation. Many of these are much larger than the original typical specimens from the Yellow Stone and Moreau Rivers, and they all likewise differ in being a little less convex and in having a somewhat narrower and deeper pallial sinus. It is possible these Deer Creek specimens may belong to a distinct species, but they agree in so many respects with *C. Deweyi* that we do not feel quite warranted in separating them specifically. If they should prove distinct, however, we would propose to designate them by the name *C. robusta*.†

## Genus TELLINA, Linnæus.

## TELLINA NITIDULA.

Shell transversely ovate, thin, rather short and convex for a species of this genus; anterior side regularly rounded; base semi-ovate, the most prominent part being in advance of the middle: posterior side narrower than the other, rounding down from above with a graceful, oblique curve; postero-basal extremity rather narrowly rounded and slightly bent to the right; dorsal outline sloping from the beaks at an angle of about  $130^{\circ}$ ; beaks moderately prominent, approximate, located a little in advance of the middle; posterior umbonal slopes prominent from the beaks to the postero-basal extremity, but not forming a distinct fold. Surface with fine concentric striæ, and a few stronger marks of growth. Sinus of pallial line of moderate length, and directed somewhat obliquely downwards; posterior muscular impression broad ovate. (Hinge unknown.)

Length, (of a specimen a little under medium size,) 1.10 inches; height, 0.82 inch; convexity, 0.40 inch.

Not having seen the hinge of this species, we cannot determine with positive certainty its generic characters, though it has the habit and general aspect of a *Tellina*. It is worthy of note, however, that the sinus of its pallial line seems to be rather short for a species of that genus. In form it resembles somewhat closely our *Tellina*? *Cheyennensis*, (Proceed. Acad. Nat. Sci., Phila., Apr., 1856, p. 82,) but is a thicker shell, with more pointed beaks, while its concentric striæ are not near so regularly arranged.

*Locality and position*.—Same as preceding.

## Genus LINGULA, Bruguiere.

## LINGULA NITIDA.

Shell small, extremely thin, narrow subelliptical in outline, the greatest breadth being near the middle; front very narrowly rounded; sides forming

\* Our *Cytherea Owenana*, (Proceed. Acad. Nat. Sci., November, 1856,) and *C. orbiculata*, Hall and Meek, should probably also be removed to the same group.

† Since this was in type, farther comparisons have satisfied us that this is distinct from *C. Deweyi*, and we now adopt for it the name *Callista robusta*.

so gentle a curve as to appear nearly parallel; beaks rather obtuse, that of the ventral valve being a little more prominent than the other; valves nearly equally convex, their greatest convexity being along the middle; surface polished, and only marked by fine lines of growth, which are obsolete on the more convex part of the valves, but become rather distinct on each side.

Length, 0.36 inch; breadth, 0.16 inch; convexity of the two valves about 0.10 inch.

This species differs from *L. subspatulata*, Hall and Meek, (Mem. Am. Acad. Boston, vol. 5, p. 380, pl. 1, fig. 2, a, b,) in being always much smaller, proportionally narrower and more convex, as well as in having its front very narrowly rounded instead of subtruncate. It never attains one-fifth the size of *L. Rouliniana* of D'Orbigny, (Pal. Fr. Ter. Cret. Braeh., p. 10, pl. 490, fig. 1,) and has a much less pointed beak, as well as a more narrowly rounded front.

It is often very difficult to distinguish the fossil species of this genus, those coming from very widely different horizons being sometimes very nearly alike, when we know from the vast extent of time that must have elapsed between the periods of their existence, that it is scarcely possible they can be identical.

*Locality and position.*—Mouth Big Horn River, from near the horizon of the base of the Fox Hills Beds of Nebraska Cretaceous series.

#### GASTEROPODA.

##### Genus NERITELLA, Humphrey.

##### NERITELLA NEBRASCENSIS.

Shell small, obliquely oval; volutions three to three and a half, increasing rapidly in size, the last one composing more than nine-tenths of the entire shell, all convex; suture well defined; aperture broad ovate, the inner side being nearly straight; columella of moderate length, flattened, smooth, somewhat arched, and usually having a distinct opercular impression; surface smooth, or only having fine obscure marks of growth, and beautifully ornamented by alternate dark and light-colored, zigzag transverse bands.

Height, 0.40 inch; greatest transverse diameter, measuring from the outer side of the aperture, obliquely upwards to the most prominent part of the body whorl on the other side, 0.50 inch; height of aperture, 0.35 inch; breadth of do., 0.25 inch.

*Locality and position.* Head Wind River, from a bed apparently holding a position at the base of the Cretaceous.

##### Genus MELANIA, Lamarck.

##### MELANIA (POTODOMA) VETERNA.

Shell conical-subovate; spire moderately elevated, rather pointed at the immediate apex; volutions six, very convex, rounded in the middle, and sometimes slightly compressed above; suture deep; aperture obliquely oval, narrowly rounded below, and obtusely subangular above, much more prominent on the outer than the inner side; inner lip a little thickened, somewhat arched, and often slightly disconnected from the body whorl below, so as to leave a small umbilical impression; outer lip thin, inversely sigmoid, or broadly sinuous above the middle and at the base of the aperture; surface marked by strong flexuous striæ of growth, crossed by more or less distinct thread-like revolving lines, which are much more closely arranged on the lower half of the body whorl than above.

Length, 0.77 inch, breadth, 0.50 inch; apical angle very convex, divergence about 47°.

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A marked feature of this species is the ventricose character of its whorls, which will alone distinguish it from all the others yet known in the Nebraska rocks. As is usual with species marked like this, its revolving lines vary much in their distinctness on different individuals. On some specimens they are well defined, while on others they are nearly or quite obsolete. Usually three or four of those around the middle and upper part of the whorls are larger, and separated by much wider spaces, than those on the under half of the body volution.

*Locality and position*, same as last.

### CEPHALOPODA.

Genus BACULITES, Lamarck.

#### BACULITES BACULUS.

Shell slender, straight, and gradually tapering; transverse section broad oval, the larger diameter being to the smaller, as 112 to 90; surface of septate portion having a few distant, broad, undefined lateral undulations.

Septa rather distant. Dorsal lobe nearly one-third wider than high, provided with two short, widely separated terminal branches, each of which is ornamented by about four short, digitate branchlets; above these terminal divisions there are on each side two very small lateral branchlets, the upper of which are much smaller than the others, and nearly or quite simple, while the other two are distinctly digitate. Dorsal saddle as long as the dorsal lobe, but scarcely more than half as wide,—rather deeply divided at the extremity into two nearly equal irregularly tripartite branches, with short, variously digitate subdivisions. Superior lateral lobe as long as the dorsal saddle, but narrower, and ornamented at its extremity by four short, subequal, palmately spreading branches, each of which has four or five very small, short, unequal branchlets, and a few digitations; above these spreading branches the body of the lobe is comparatively narrow, and provided with a single small digitate lateral branch on each side. Lateral saddle of the same size as the dorsal saddle, and very similarly divided. Inferior lateral lobe broader than the superior, and provided with six short spreading unequal, digitate, terminal branches, of which the three on the dorsal side are a little smaller than the others. Ventral lobe comparatively large, about twice as long as wide, contracted near the middle, and ornamented at the extremity by seven or eight palmately spreading, nearly equal digitations.

Our specimen of this species is a septate fragment four inches in length. At its smaller end it measures 0.90 inch in its greater diameter, and 0.70 inch in its smaller do. Its greater diameter at larger end is 1.12 inch, and its smaller do. 0.90 inch.

This species will be at once distinguished from the Nebraska shell, referred by all authorities to *B. ovatus* of Say, by its much more rounded form; indeed, its two diameters are so usually nearly equal, and its dorsal and ventral sides so similar, that it appears almost entirely cylindrical at a first glance, though its section is a little oval. It has a proportionally larger ventral lobe than *B. ovatus*, while in all its other lobes and saddles it presents as great differences as are often seen between those of species of this genus.

In its nearly cylindrical form, it is more like *B. Spillmani* of Conrad (Jour. Acad. Nat. Sci., Phila., 2d ser., vol. iii., pl. 35, fig. 24) than any other species with which we are acquainted; though it is not flattened on the back, nor obtusely carinate on its front, (dorsal side,) as in that shell. As Mr. Conrad's specimen does not show the septa, we have no means of knowing whether these forms resemble in their internal characters or not.

*Locality and position.* Deer Cre-k, a tributary of the north branch of Platte River. Fox Hills Beds, upper part.

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## TERTIARY SPECIES.

## GASTEROPODA.

Genus VIVIPARA Lamarck.

VIVIPARA RAYNOLDSANA.

Shell, large, ovate; spire rather elevated, pointed at the apex; volution about six and a half; ventricose, increasing rather gradually in size, sometimes a little compressed around the middle, so as to present a slightly shouldered appearance above; last one often prominently rounded or faintly subangular a little below the middle; suture well defined; aperture broad subovate or subcircular; columella scarcely perforate. Surface of upper whorls usually smooth, or only marked by very obscure lines of growth, which generally become quite strong near the aperture, and on the under side of the body whorl. On the last two volutions of well preserved specimens, more or less distinct threadlike revolving striæ are usually seen, which are rarely continued upon the succeeding turns above; generally two or three of the revolving lines on the middle of the whorls are larger than the others.

Length, 1.56 inches; breadth, 1.14 inches; apical angle convex; divergence  $60^{\circ}$  to  $65^{\circ}$ .

In size and general outline, this fine *Vivipara* resembles our *V. Leidyi*, (= *Paludina Leidyi*, Proceed. Acad. Nat. Sci. Phila., June, 1856, p. 123), but it differs in having much more convex whorls and a deeper suture. It also differs from that species in always having its revolving lines most strongly defined on the lower whorls, while those of *V. Leidyi* are entirely confined to the upper turns near the summit of the spire.

From our *V. Leai*, (= *Paludina Leai*, Proceed. Acad. Nat. Sci. Phila., June, 1856, p. 121), it will be readily distinguished by its larger size, proportionally more elevated spire, and more or less distinct revolving lines. It also differs in having its whorls usually a little compressed around the middle, so as to give them a slightly shouldered appearance above. This latter character and the revolving lines are not, it is true, always distinctly marked, but when they are not, its more attenuate spire and larger size, will alone always serve to distinguish it from *V. Leai*.

Amongst recent species it is represented by such forms as *V. Burroughiana* Lea, and *V. carinata* Val. It is longer, proportionally thicker, and has a more elevated spire, than the first; and differs from the latter not only in being much longer, but in always having less angular whorls. Its aperture is also rounder, and less extended below than in *V. carinata*.

Named in honor of Captain Wm. F. Reynolds, U. S. Topographical Engineers.

*Locality and position.* Lower fork of Powder River, Fort Union or Great Lignite Group. Tertiary.

Genus HELIX Linnæus.

HELIX SPATIOSA.

Shell large, rather thin, subdiscoidal, the spire being depressed, but not flat; umbilicus about half to two-thirds the breadth of the outer whorl at the aperture, deep, conical, and showing near one-fourth of each volution of the spire; whorls five and a half to six, increasing gradually in size, somewhat depressed and sloping outwards above, narrowly rounded, or (in young specimens) subangular around the periphery,—compressed convex below, and rounding abruptly into the umbilicus on the inner side; suture moderately distinct; aperture transversely suboval, being a little wider than high, and

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rather deeply sinuous on the upper inner side, for the reception of the preceding whorl; lip oblique, produced above and retreating below, somewhat distinctly reflected, particularly on the under side; surface marked by well defined lines of growth, which cross the upper side of the whorls obliquely.

Height, 0.90 inch; greatest breadth, 1.83 inches; breadth of aperture, 0.74 inch; height of do., 0.72 inch. Apical angle convex, divergence about 120°.

This fine large *Helix* will be at once distinguished by its size and general form from any other species yet known in the Nebraska rocks. Some twelve specimens of it were obtained, all of which are in the condition of internal casts. One or two of them retain some fragments of the shell, which are marked by strong lines of growth; none of the specimens, however, are sufficiently well preserved to show whether or not there were any fine revolving striae. From impressions left on the matrix, the aperture seems to have been a little constricted on the under side, but none of the specimens are in a condition to show whether or not the lip was much thickened.

Amongst recent species it may be compared with the Chilian *H. laxata* of Furisac, from Coquimbo, with which it agrees in size and form, though its umbilicus is proportionally a little smaller, and it has about one whorl more. All its volutions are likewise less rounded on the under side, while its lines of growth are much stronger. The most nearly allied North American living species is *H. Newberryana* of W. G. Binney, a California species, from which it will be readily distinguished.

*Locality and position.* Wind River Valley. From Wind River Group. Tertiary.

#### HELIX VETERNA.

Shell of about medium size, obliquely oval and subrhombic in outline; volutions five and a half, increasing rather rapidly in size, those of the spire moderately convex; last one comprising about half the entire length, most convex below the middle, rounded on the under side, and somewhat obliquely produced below; umbilicus small or closed; suture distinct, but not very deep; aperture ovate, rather narrowly rounded below, and somewhat obtusely angular above, slightly modified on the inner side above, by the convexity of the preceding whorl; lip reflexed; surface marked by distinct, oblique, threadlike striae.

Height, 1.24 inches; breadth, 1.05 inches; height of aperture, 0.75 inch; breadth of do., 0.57 inch. Apical angle very convex, divergence, 85° to 90°.

This species is about the size, and presents much the appearance of *H. Leidyi* Hall & Meek, (Mem. Am. Acad. Arts and Sci. Boston, vol. v., n. s., p. 394, pl. 3, fig. 12 a b.) It is a more elongated shell, however, and its spire is a little more elevated, while its body whorl is more produced below. Its aperture is also quite different, not being near so oblique and more extended below.

*Locality and position.* Same as last.

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#### CORRECTION.

In printing our Catalogue of Nebraska Fossils, in the October number of the Proceedings for 1860, the family name ARCADÆ was inadvertently omitted on page 428, between the names *Inoceramus Balchii* and *Arca sulcata*, which makes it appear as though we were intending to place the genera *Arca*, *Cucullæa*, *Axinæa* and *Linopsis* in the family AVICULIDÆ  
1861.]

## Description of NEW PLANTS from Texas,

BY S. B. BUCKLEY.

These plants were collected by the author while engaged in the State Geological Survey of Texas, during 1860 and '61. Specimens of them are in the herbarium of the Academy of Natural Sciences at Philadelphia, and also in the herbarium of Elias Durand, Esq.

## RANUNCULACEÆ.

*Clematis Texensis*, n. s.—Caule scandente, foliis pedunculatis, integris, lato-ovatis, acuminatis, mucronatis, breviter petiolatis, foliis caulinis imparipinnatis, longe petiolatis, foliolis pusillis 1-3 lobis, segmentis lanceolatis, acutis, pedunculis unifloris, sepalis coriaceis, apice parum reflexis; fructus?

On the Colorado River above Austin.

Leaves thin, not coriaceous. Whole plant smooth; peduncles 2-2½ inches long; flowers about an inch long, subconical, purple, floral leaves 2-4, near the junction of the peduncle with the stem large, crowded, and on petioles 2-3 lines long, at the base of which are 2-4 spatular bracts. The unequally pinnated stem leaflets small, 1-3 lobed, segments lanceolate and acute, part of these stem leaflets are on long tendril like petioles. Flowers in May.

*Clematis Coloradoensis*, n. s.—Caule scandente, ramis rotundis, parce pubescentibus, foliis petiolatis, integris, vel 2-3 lobis segmentis ovato-lanceolatis, acuminatis, utrinque glabris, pedunculis axillaris, nudis, unifloris, sepalis coriaceis apice reflexis, fructus?

North-western Texas near the Colorado River, May.

Leaves very thin and veins not prominent, mostly 3-lobed, sinuses of the lobes narrow, and extending from one-third to two-thirds of the leaf; lobes acute and mucronate, the middle one largest. Some of the leaf bearing branches twisted, and tendril-like; peduncles leafless, axillary 3 inches long and one-flowered, flowers ¾ inch long, leaflets 1-2 inches long and 1-1½ wide; foot stalks of leaflets ½ an inch in length. Stem, petioles and peduncles sparingly pubescent.

## CRUCIFERÆ.

*Streptanthus (Arabis) glabrifolius*, n. s.—Glaberrimus, caule erecto, 3-4 pedali, parce ramoso, foliis oblongis, lineari-lanceolatis, basi attenuatis, breviter petiolatis, acutis, vel subobtusis, petalis spathulatis, (roseo-purpureis) unguibus calyce subdimidio excedentibus, siliquis immaturis teretiusculis, stylis brevissimo obtusis. Seminibus?

Sandy post oak woods north of Fort Belknap.

Stem erect, and sparingly branched, 3-4 feet high; flowers crowded near the top on pedicels about ¼ of an inch long; petals ¾ lines long; leaves 3-5 inches long and about ¼ of an inch wide; petioles 2-4 lines long. Lower leaves subobtusely, upper leaves linear acute.

*Streptanthus (Arabis) Brazoensis*, s. nov.—Subglaucescens, foliis caulinis lanceolatis, radicalibus longe petiolaris, oblongo-ovatis ad basi parce lyrato sectis et repando dentatis, dentibus submucronatis; floribus pusillis, erectis; petalis oblongo-spathulatis, albidis et purpureo-tinctis, calycem paulo excedentibus, filamentis liberis, paulo exsertibus, siliquis lato linearibus, in loculis circe 20 seminibus latissime alatis septo æqualibus.

On the Upper Brazos near Fort Belknap. May.

Plant 1-2 feet high; leaves 1½-2 inches long, the upper ones lanceolate, entire, acute and attenuate at the base into a petiole 4 lines long, with 1-2 linear bracts at its base. Radical leaves lyrate, petioled, subpubescent, petioles an inch long, flowers very small pedicels 4 lines long, seeds circular.

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*Lepidium Texanum*, s. nov.—Annuum, glabrum vel parce pulverulentum, caulibus diffusis, racemosis; foliis superne integris anguste linearibus, basi attenuatis, radicalibus longe petiolatis, et pinnato-sectis, racemis densifloris, floribus minutissimus, petalis ovato-lanceolatis, acutis calyce paulo excedentibus, siliculis elliptico-ovatis apteris, valde emarginatis, glabris; stylo brevissimo.

Near Fort Mason. June.

1-2 feet high, divaricately branched, branches terminated by long racemes of minute flowers; silicles a line in length, strongly emarginated; the very short style included.

#### CARYOPHYLLACEÆ.

*Arenaria (Alsine) monticola*, s. nov.—Annua, pumilla, parce pubescenti-glandulosa, caulibus diffusis, foliis pumilis, obovatis, acutis, basi attenuatis, subpetiolatis, petalis obovatis, acutis, calyce fere duplo brevioribus, sepalis ovato-lanceolatis, acuminatisque scariosis; floribus longe pedicellatis.

Limestone, mountain tops middle and northern Texas. May.

Glabrous or sparingly pulverulent pubescent; 6-10 inches high, diffusely branched from the base; leaves 3-4 lines long.

#### MALVACEÆ.

*Sida Sabana*, s. nov.—Caule erecto, 3-4 pedali tereti. Foliis ovato-lanceolatis petiolatis, inequaliter dentatis, dentibus acutis, vel subobtusis caulibus, petiolisque et pedicellis pulverulentis, floribus pumilis pedicellatis subpaniculatis, petalis oblongo-obovatis, sepalis ovato-lanceolatis, acuminatis.

Prairies Sau Saba County. June.

Divaricately and sparingly branched; leaves 1-1½ inches long; petioles 4 lines in length; flowers yellow and crowded or solitary on short pedicels, axillary, or at the extremity of the branches.

*Callirrhoe palmata*, s. nov.—Caule prostrata, parce strigosa, foliis longe petiolatis, reniformisque palmato 3-5 sectis, laciniis 3-5 fidis subobtusis acutis, pedunculis erectis, axillaribus, solitariis, unifloris folio longioribus; calycis hirsutis, lanceolatis, acuminatis, petalis obovato-rotundatis, albis, vel parum cæruleis, calyce duplo longioribus; floret June.

Common on Brady's Creek north of Fort Mason. Stems from a small, long, tap root, creeping in different directions to the distance of 1-2 feet; leafy, radical and cauline leaves, similar, flowers, 1-1½ inches in diameter, generally white, rarely of a pale purple; peduncles 2½-3 inches long; petioles ½-2 inches long.

*Sidalcea Atacosa*, s. nov.—Tota planta hirsuta, caule erecta, ramis numerosis foliis ovatis, plurime, et irregulariter sectis laciniis acutis; multifloris, floribus axillaribus et capitatis, pedicellis calyce brevioribus, pedicellis bracteosis, valde hirsutis, coccis hirsutis, rugosis, subreniformis.

On the Atacosa River in Western Texas. May. Stems about a foot high; lobes of the unequally divided leaves gash-toothed. Our specimens are in fruit only.

*Malvastrum lineari-folium*, s. nov.—Ramis, et foliis parce pilosis. Involucellum nullum, vel caducum, humile, foliis petiolatis, lineari-lanceolatis, ad apicem dentatis, bracteolis ad basi calycis numerosis, lineari-elongatis, valde pilosis calyce longioribus; segmentis calycis ovatis, acutis, floribus glomeratis, axillaribus, seu capitatis, carpellis muticis.

Northern Texas. May.

Stems branching 6-10 inches high; leaves about ¾ of an inch long and 2-3 lines wide; petioles 6-8 lines long; flowers small, shortly pedicellate; at the 1861.]

base of the pedicels are numerous long linear bracts or stipules, some of which are also at the foot stalks of the leaves, and coated with long stellate hairs. Stipules about  $\frac{1}{2}$  an inch long.

ELIDURANDIA, Gen. nov. MALVACEARUM.

Involucellum polyphyllum, persistens; stigmata 5-capitata; capsula 5-loculare; carpellis unilocularis verticillater 2-spermis.

Calyx five-parted involucellate, with 8-10 long spatulate and persistent bracts; petalis 5 obovate, hypogynous, convolute in æstivation; stamens numerous, monadelphous at the summit of an urceolate column; filaments short; anthers reniform, ovules ascending peritropous, micropyles inferior. Fruit an oblong, depressed capsule, subobtusely pointed, and included in the involucre; valves alternate with the sepals; dissepiments attached to the middle of the valves; seeds 2 in each cell, ascending, united and truncate at points of union; subovate; testa coriaceous, rough and woolly; embryo small; incurved in the fleshy albumen; radicle inferior.

Elidurandia Texana.—Herbaceous, foliis ovatis, petiolatis, integris, repando-dentatis; dentibus mucronatis; floribus longe pedunculatis; corolla ampla coccinea.

Plant one to two feet high, branching from the root; outer branches procumbent; leaves 1-1 $\frac{1}{2}$  inches long; petioles  $\frac{1}{2}$  inch long, and peduncles 1-3 inches in length, one-flowered.

On the banks of the Colorado River, above Austin. Flowers May and June.

In honor of the well known botanist, Elias Durand, author of several papers on American botany.

LINACEÆ.

Linum (Linopsis) San-Sabaenum, s. nov.—Annum, humile. Ramis numerosis gracilibus, teretis, foliis parvis, linearibus, calycis 2-4 stipularibus, linearibus; ramis, foliisque calycis, canescenti-pilosis; floribus parvis, plurimis, pedicellatis, capsulæ parvæ, depresso-globosæ, semiseptis.

Prairies San Saba County.

6-8 inches high, with many slender branches from near the root. Leaves  $\frac{1}{2}$  an inch long and scarce a line wide, not subulate or rigid, pedicels 4 lines long.

RUTACEÆ.

Zanthoxylum hirsutum, s. nov.—Arbor. Ramis junioribus et petiolis, armatisque valde hirsutis, foliis pinnatis 2-3 jugis, foliolis ovato-lanceolatis, crenatis, obtusis, floribus breviter paniculatis axillaribus, seu terminalibus, carpellis subcordatis, 1-2 spermis, spermi subovatis.

Near Corpus Christi.

Tree about 25 feet high and 8-12 inches in diameter. Branches armed with stout recurved prickles. Leaflets opposite or subalternate. Trunk and old branches gray and smooth.

VITACEÆ.

Ampelopsis (Cissus) heptaphylla, s. n.—Foliis petiolatis, palmato 7-foliatis; foliolis pumilis ovato-lanceolatis sessilibus vel breviter petiolatis, apice mucronato-dentatis, acuminatis, paniculis ramis dichotomo-divaricatis, longe pedunculatis; floribus parvis, petalis distinctis, oblongo-lanceolatis, subobtusis, staminibus exsertis. Stylo longissimo, baccis rotundis 3-4 spermis.

Common on the mountains in Burnet and San Saba Counties, climbing sometimes to the height of 25-30 feet.

Vitis monticola, s. nov.—Ramis decumbentibus 4-6 pedali. Foliis

[Dec.

parvis, cordatis, dentatis aut creuatis, dentibus inequalibus basi sinuatis; sinu profundo et angusto, vel lato-repando; glabriusculis, junioribus sub-pubescentibus; ramis, petiolis, nervisque foliorum arachnoideo-pubescentibus. Racemis valde compositis; baccis confertis, albis ambreivse, gustu suavi et inter uvas Americanas gratissime. Crescit in Texas.

Leaves  $1\frac{1}{2}$ -2 inches long, and nearly of the same width; petioles about an inch and a half in length. Fruit ripe in July and August,  $\frac{3}{4}$  of an inch in diameter, skin thin. Grows in the mountainous districts of Burnet, Bell and Hays Counties.

*Vitis Linsecornii*, s. n.—Ramis decumbentibus 4-6 pedali. Foliis magnis reniformi-cordatis integris, vel 5-lobatis; totis obtusis, crenato-dentatis; dentibus submucronatis, superne glabriusculis; subtus dense rufo-arachnoideo-tomentosis et petiolis et junioribus ramis; racemis compositis, foliis brevioribus; baccis purpureis; gustu acido grato. Crescit in Texas et Louisiana.

This grape has larger leaves than any other American species; 6-10 inches wide and of nearly the same length. Its fruit ripens the first of July; skin thin, and berry  $\frac{3}{4}$  in. diameter, juicy and of a pleasant acid taste.

*Vitis mustangensis*, s. n.—Foliis cordatis, integris non nunquam 3-5 lobatis, parum ad basi sinuatis; superne viridissimus, glabris, infra pedunculisque et ramis junioribus dense albo-floccoso-tomentosis; racemis compositis, foliis brevioribus, baccis magnis, confertis, atro-cæruleis, subpellico saccum rubricundum acridissimæ-ferventum continentibus; pulpa vera non ingrato gusto, nec noscia.

This is called the Mustang grape in Texas, where it is very common. It makes an excellent wine; but is little esteemed for eating on account of an acrid juice beneath the skin, which, if swallowed, gives a burning pain in the throat. It climbs high, bears abundantly and has large fruit, which is sometimes nearly an inch in diameter. Its leaves are neither toothed or mucronate.

A more detailed account of these new species of *Vitis* is given by the author in an article on North American Grapes, in the Patent Office Report, (Agricultural,) 1861.

#### LEGUMINOSÆ.

*Psoralea palmata*, s. nov.—Caule erecto 2-3 pedali, simplo, vel parce ramoso, parum canescenti-villoso, foliis 5-foliat, petiolatis, foliolis lanceolatis, submucronatis, subtus canescenti-pilosis, supra rugosis, floribus longe pedunculatis, subcapitatis, bracteatis, bracteisque calycibus villosis, ovato-lanceolatis, acuminatis.

South of Fort Belknap.

Stem simple, with few leaves; 2-3 feet high; petioles 1-2 inches long. Leaflets  $1\frac{1}{2}$ -2 inches long. Flowers axillary and terminal, on peduncles 3-5 inches long; 8-10-flowered in a loose head.

*Indigofera cinerea*, s. nov.—Annuæ, cinerea, decumbens, caule tereti, ramoso, foliis impari pinnatis 2-5-jugis, foliolis spatulatis acutis ad basi attenuatis, subpetiolatis stipulis parvis subulatis, pedunculis parvi-floris, folio multo longioribus, calycis lineari-subulatis corolla brevioribus, leguminibus rectis, reflexis, teretis, acutis, 4-6 spermis.

Washington County, Texas. Miss Sallie Linsecorn.

Whole plant covered with white appressed hairs. Leaves, including the petioles, 1-1 $\frac{1}{2}$  inches long; leaflets  $\frac{1}{2}$  in. in length; peduncles 3-7 inches, axillary and capitate, few-flowered; flowers large in proportion, white tinged with red.

*Indigofera Texana*, s. nov.—Tota planta canescenti-pilosa, suffruticosa erecta vel decumbens, caule tereti, foliis subsessilibus, foliolis cuneati-obovatis 1861.]

breviter petiolatis, 2—3-jugis cum impari sen oppositæ folioli, submucronatis; pedunculis elongatis parvifloris, calycis longe lineari-acuminatis hirsutis, stipulis parvis subulatis, leguminibus reflexis, valde quadrangulatis, rectis, acutis, 8—10-spermis.

Near Fort Mason, Texas. June.

12—18 inches high, with many stems from the same root. Leaflets  $\frac{1}{2}$  an inch long, leaves 1— $1\frac{1}{2}$  inch long; pods 1— $1\frac{1}{2}$  inch in length; spikes 3—4 inches.

*Amorpha Texana*, s. nov.—Fruticosa, foliis magnis, foliolis 4—6-jugis, elliptico-oblongatis emarginatis mucronatis basi obtusis, breve petiolatis, subtus glanduloso-pubescentibus supra glabris, spicis axillaribus vel capitatis glanduloso-tomentosis, folio parum longioribus, sublaxifloris, floribus breve pedicellatis, calycis dentibus, subæqualibus, ovatis, acutis, stylo exserto villosa, leguminibus subobovatis, arcuatis, acutis.

On the Pierdenalis River. June.

Shrub 4—5 feet high. Racemes and flowers brownish-red; filaments and style long, exserted; leaflets 1—2 inches long and  $\frac{3}{4}$ — $1\frac{1}{4}$  wide, the pairs at intervals of about an inch from each other; corolla more than twice the length of the calyx; flowers large in comparison with the other species.

*Astragalus Brazoensis*, s. nov.—Erectus, glabriusculus, subsessilifolius; stipulis triangulari-ovatis, acutis; foliolis obcordatis, 5—7-jugis, pedunculis folio parum longioribus; floribus capitatis, ocreoleucis; calycis dentibus parvis acuminatis, parce canescenti-pilosis; leguminibus membranaceis, glabris, didymis; loculis monospermis; seminibus reniformis glabris.

Western Texas. June.

6—8 inches high; smooth or with a very few short, appressed white hairs; leaflets 3 lines long, the lowest pair near the stem. Legumes double the size of those on *Astragalus didymocarpus*, Hook.

*Phaca (Astragalus) cretaea*, s. nov.—Tota parce canescenti-pilosa, subcaulis diffusis; foliis longe petiolatis; foliolis 6—8-jugis, ovato-lanceolatis, submucronatis; scapo foliis parum longiori; floribus capitatis ocreoleucis; bracteis oblongo-linearibus; calycis dense pilosis, dentibus longe attenuatis, leguminibus ovato-lanceolatis, acuminatis, coreaceo-membranaceis, incanis, lato-falcatis, aut rectis.

Cretaceous rocks, Northern Texas. May.

Plant 4—6 inches high. Many leaves and scapes from a stem  $\frac{1}{2}$ —1 inch high. Scapes and leaves nearly equal. Legumes 1— $1\frac{1}{2}$  inches long. Leaflets 4 lines long and 2—3 lines wide.

*Baptisia Texana*, s. nov.—Glabra, caule erecto ramoso; foliis palmato-trifoliatis, breviter petiolatis; foliolis ovato-lanceolatis, acutis; stipulis ovato-lanceolatis, acuminatis, foliolis, triplo brevioribus, bracteis minutis, ovatis, caducis; racemis erectis brevibus; pedicellis calycem æquantibus; dentibus calycibus lato-ovatis, acutis, floribus magnis breve pedicellatis; legumine immaturæ lineari-lanceolati, stipati.

Northern Texas. May.

Plant  $1\frac{1}{2}$ —2 feet high; petioles 2 lines long; pedicels 3—4 lines in length; leaflets  $\frac{3}{4}$ —1 inch long; stipules  $\frac{1}{4}$ — $\frac{1}{2}$  in. in length; flowers few, and not crowded.

*Cassia Texana*, s. nov.—Suffruticosa; ramis et foliis glanduloso-pubescentibus, foliolis 14—18-jugis, lineari-oblongis, subfalcatis, 2—3 nervis marginæ; ciliatis; stipulis ovatis, acuminatis; racemis 1—2 floribus folio subæquantibus; legumine lato lineari acuminato, 6—10 spermis.

Sandy soil, Bastrop County.

Stem diffusely branched and 6—10 inches high; lowest pair of leaflets near the stem, and each succeeding pair shorter to the apex, giving an ovate form to the leaf. Flowers yellow and large; legume 1—2 inches long.



## Nov. Gen. CESALPINÆ.

*Hoopesia*.—Calyx ebracteatus, profunde quinquefidus vel quinquepartitus; laciniis lanceolatis, subinæqualibus, lineari-acutis, corolla petalis 5 subpapi-lionaceis, longe unguiculatis; staminis 10 libera, filamentis ad basi lanuginosis, ovarium stipatum pluriovulatum; stylus basi dilatat, filiformis, filamentis parum longior; stigma parva, legumen longe stipatum, lato-lanceolatum parce compressum, obtusum, 8—10 spermis, tardi dehiscens, semen reniformis.

*Hoopesia arborea*.—Arbor, ramis spinosis, foliis bipinatis, 1—3-jugis, foliolis oppositis, obovatis obtusis, 3—6-jugis, floribus axillaribus, subsolitariis, breviter pedunculatis.

Near Corpus Christi. May.

Tree 20—25 feet high and 8—12 inches in diameter; bark of trunk and branches smooth, and of a pale green; branches numerous, forming a dense shade; legume 4 inches long, 10 lines wide and 8 lines thick. Seeds large, divided by septa; spines axillary, double, stipular, subulate and small; flowers yellow, with reddish-brown lines near the base of the limb of the petals. Insects have destroyed the embryo in our fruiting specimens.

Dedicated to Joshua Hoopes, of Westchester, Pennsylvania, a zealous botanist, who has long studied and admired trees;

*Acacia Sabeanæ*, s. nov.—Fruticosa; ramis teretibus, junioribusque petiolis glanduloso-pubescentibus; foliis bipinnatis, pinaris 2—4-jugis, pinnulis 4—6-jugis, ovatisve rhombo-ovatis, submucronatis, utrinque glabris; stipulis ovatis, longe acuminatis; floribus magnis, longe-pedunculatis, monocephalis, erectis, capitulis multifloris, filamentis longe exsertis, legumine immaturæ lato lineari tomentose, falcata acuminata, longe stipata.

Banks of the San Saba River. June.

Shrub 6—10 feet high, branching from near the ground. Leaves, including the petiole, 4—5 inches long, leaflets inequilateral and  $\frac{3}{4}$  of an inch long and  $\frac{1}{2}$  an inch wide; flowers numerous, bright yellow, in solitary heads on peduncles 2—3 inches long; heads round, an inch in diameter.

*Acacia Durandiana*, s. nov.—Fruticosa, glabriusculis alternatis recurvis; pinnis 2—3-jugis; foliolis 3—4-jugis, obovatis mucronatis, spicis elongatis, multifloris, foliolis multo longioribus, floribus brevissime pedicellatis, legumine glabro, lato-lineari obtusove acuto margine undulato.

Near Fort Belknap.

Shrub 3—4 feet high, diffusely branched from the base, and armed with rather slender, recurved prickles. Flowers yellow and numerous, spikes 2—3 inches long. Leaflets 2—3 lines long, inequilateral and mucronate, subglandular and slightly pubescent; pod 2—3 inches long and of unequal width, from  $\frac{1}{2}$ — $\frac{3}{4}$  of an inch, the apex often rounded or retuse and rarely acute.

*Acacia Nueciana*, s. nov.—Fruticosa; ramis junioribus, folisque et spicis glanduloso-pubescentibus; foliis 3—5-jugis foliolis 7—10-jugis, lineari-lanceolatis inequilateralis acutis, breviter petiolatis spinis stipularibus rectis parvis subulatis; pedunculis solitariis elongatis, floribus capitatis 10—14-meris, calycis campanulatis breviter dentatis, petalis calyce triplo longioribus acutis.

Near the Nueces River.

Shrub 4—6 feet high, the stipular prickles 2—3 lines long, and in divergent pairs; flowering peduncles 1—1 $\frac{1}{2}$  in. long; florets capitate shortly pedicellate, corolla  $\frac{1}{4}$  of an inch long; filaments long, exserted; heads of flowers  $\frac{3}{4}$  of an inch in diameter; leaves 2—3 inches long; leaflets 3—4 lines in length and 2 lines wide.

*Mimosa calcaria*, s. nov.—Humilis, fruticosa; 8—12 policaricis, valde armatis; spinis rectis duplis longissimis, pinnis uninjugis; foliolis 6—10-jugis, 1861.]

obovatis, obtusis, puberulis, capitatis; capitibus, lanoso-tomentosis; floribus albis leguminibus?

Limestone hills near Live Oak in South-western Texas.

Plant about a foot in height, branching from the root, very thorny; spines axillary, slender, about an inch in length. Leaves small, an inch long. Leaflets dense, 2—3 lines long; peduncles  $\frac{3}{4}$  of an inch long; heads globose and solitary.

*Desmanthus pedunculatus*, s. nov.—Suffruticosa, caule tereti, pinnis 6—8-jugis, pilosis; stipulis setaceis, foliolis 12—16-jugis, elliptico-oblongis, submucronatis, pedunculis teretis, folium subæquantibus, capitulis globosis, leguminibus umbellatis, rectis, linearis, compressis, acuminatis, glabris, 12—22 spermis, seminibus subreniformis.

Northern Texas. May.

Plant 2—3 feet high, sparingly branched, the whole, excepting the pods, covered with a white, glandular pubescence. Leaves, including the petioles, 2—5 inches long; peduncles  $2\frac{1}{2}$ —3 inches long; legumes 2—3 in. in length.

*Desmanthus rhombifolius*, s. nov.—Suffruticosa, caulisque pedunculis angulatis, subglandulosis, stipulis parvis, subulatis; foliis 3—5-jugis; foliolis 6—8-jugis, rhomboideo-ovatis, ad basi inequalibus, brevissime pedicellatis, inequilateralis, obtusisve submucronatis, pedunculis folium longioribus, capitulis globosis, leguminibus umbellatis, falcatis, rostratis, compressis 8—12-spermis, seminis ellipsoideis.

Buchanan County. June.

Subdecumbent. It has several stems about a foot long from the root. Stems and peduncles glandular pubescent. Leaves, including the petioles, about an inch and a half long; peduncles 3—4 inches long; legumes  $1\frac{1}{2}$ —2 inches long; leaflets very inequilateral, hairy on the margins, 2—3 lines long,  $1\frac{1}{2}$ —2 lines wide.

#### ROSACEÆ.

*Cratægus Texana*, s. nov.—Arbor 20—25-pedalis; inermis; foliis lato-ovatis ad basi cuneatis, inequaliter dentatis; dentibus acutis; subtus junioribusque et petiolis pubescentibus; peduncles, pedicellisique calycis dense lanoso-tomentosis; petalis obovatis, calyce longioribus; calycis lacinis lateo-latæ, acuminatæ; fructu coccinei, ellipsoidea calyce coronati.

Common along the Brazos and Colorado Rivers.

Bark of trunk and branches dark gray, furrowed and rough, resembling that of the dogwood, (*Cornus florida*.) Leaves large, incisely and doubly toothed, nearly as broad as long; petioles not margined, about an inch in length; old leaves arachnoid, tomentose beneath, smooth above; fruit large, red and edible; ripe last of October; trunk 6—10 inches in diameter.

#### ONAGRACEÆ.

*Gaura triangulata*, s. nov.—Suffruticosus, ramosissimus, ramulisque foliis parce canescenti-pilosis, floribus parvis, foliis sessilibus, lineari-lanceolatis, acutis, rare dentatis, ramis floriferis nudis, parum elongatis; bracteis minutis, subulatis; fructibus glabris valde triangularibus, basi obtusis, subsessilibus apice breviter subacutis.

Prairies northern Texas. May.

Plant a foot high. Leaves  $\frac{3}{4}$ —1 inch long, 2—3 lines wide, crowded; fruit 5 lines long and 3 lines wide, angles acute.

*Eanothera (Salpigia) Lampasana*, s. nov.—Caule subprostata, glanduloso-pilosa; foliis numerosis, ovato-lanceolatis, integris subsessilibus, acutis, glanduloso-pubescentibus, calycis tubo longissimo; petalis lato-obovatis, eroso-crenulatis, stamina longioribus; stigmati lato-discoideo, capsulis cylindraceis, sessilibus, valde pilosis.

Prairies, Lampasas County.

Stems 1—2 feet long, with many branches; leaves of the branches  $\frac{1}{2}$  an inch long, terminating rather abruptly at both ends; flowers nearly 2 inches long, and the diameter of the expanded petals  $1\frac{1}{2}$  inches.

*Oenothera* (*Oenagra*) *Leonae*, s. nov.—Parum pulverulenta-pilosa; foliis ovato-lanceolatis; longe acuminatis, sessilibus, parce dentatis, dentibus minutis, floribus magnis, plurimis; spicis striatis, elongatis; bracteis lanceolatis, acuminatis; calyce tubo lineari-elongata, petalis ovato-lanceolatis, acutis, capsulis elongatis, subquadrangulatis, hirsutis, arcuatis.

Near Leon River. June.

Stems simple,  $1\frac{1}{2}$ —2 feet high; capsules sessile,  $\frac{1}{2}$  an inch long; upper leaves somewhat clasping, those near the root attenuate almost to a petiole; stems and leaves subpilose, with short white, appressed hairs; leaves  $1\frac{1}{2}$ — $2\frac{1}{2}$  inches long; flowers nearly 2 inches long and  $1\frac{1}{2}$  broad.

#### LOASACEÆ.

*Mentzelia* (*Eumentzelia*) *petiolata*, s. nov.—Caule decumbente, ramosissime, foliis ovatis, parce grandi-dentatis, acutis, ad basi subcuneatis, longe petiolatis; segmentis calycis subulatis, corolla parum longior, petalis subovatis, acutis; capsulis breviter clavatis, canescenti-hirsutissimis.

Llano County. June.

Stems 2— $2\frac{1}{2}$  feet long; petioles 1— $1\frac{1}{2}$  inches long; capsules  $\frac{1}{2}$  an inch in length. Whole plant rough-pubescent, with the adherent stems and leaves peculiar to the genus.

#### SAXIFRAGACEÆ.

*Saxifraga* (*Micranthis*) *Texana*, s. nov.—Foliis omnibus radicalibus, glanduloso-pubescentibus, obovatis, integris, breviter lato-petiolatis; caule simplice, parce pubescenti; bracteis linearis, vel subspathulatis; floribus paniculato-cymosis, sepalis ovatis, subacutis, petalis spathulato-obovatis; calyce parum longioribus.

Prairies Northeastern Texas. March.

4—6 inches high. Leaves nearly sessile, and, including petiole,  $\frac{3}{4}$ —1 inch long, obtuse and about an inch wide.

#### UMBELLIFERÆ.

*Cymopterus* (*Eucymopterus*) *macrorhizus*, s. nov.—Glaucus; radix napiformis, caulis erectis; foliis pinnati-decompositis, divisionibus confluentibus; foliorum segmentis plurimis, ovatis, seu subovatis, obtusis, vel subacutis, involucellis 5—7-partitis, lobis lanceolatisve ovatis, membranaceis, laciniatis.

Prairies north of Austin. Last of March.

6—8 inches high; root 1—2 inches in diameter; caudix 1—2 in. high; leaves long petioled, oblong ovate in outline, the somewhat winged petiole expanding into leaflets, which are 8—10 lobed; petioles of the outer leaves widening near the base, and clasping the stem; leaves 2—3 inches long; petioles 1—2 inches in length; fruit 3 lines long; wings wide and thin.

*Eurytenia* *macrophylla*, s. nov.—Tota glabra; umbellis magnis, 10—14 longe radiatis; involucre e foliolis parvis 3-sectis; segmentis longe linearis involucre e foliolis numerosis, 3-fidis, laciniis, linearis, acutis, petalis albis, lato obovatis, emarginatis; foliis caulinis superiores pinnati sectis, segmentis elongato-linearis; inferiores pinnatis, 2—3-jugis; foliolis ovatis in-qualiter magna-dentatis, seu lanceolatis, dentibus mucronatis; foliis radicalibus petiolatis, 3—5 lobis segmentis ovatis.

Washington County. Dr. Linsecom.

Lower cauline leaves 3—4 inches in length; leaflets sessile or clasping, about an inch and a half in length and an inch wide; petioles  $1\frac{1}{2}$ —2 inches long; rays of the umbel 2—3 inches.

1861.]

## COMPOSITÆ.

*Eupatorium Sabeanum*, n. s.—Suffruticosa, paullum pubescenti; ramis teretibus, erectis, plurimis; foliis oppositis, petiolatis, ovatis, acuminatis, ad basi subcuneatis; involucri squamis imbricatis, oblongo linearis, apice obtusis, vel submucronatis; achenia oblongæ et quinquecostata, glabra; costis albo-sericeis.

San Saba County. May.

This species belongs to the section *Cylindrocephala* of De Candolle. Its leaves are  $1\frac{1}{2}$ —2 inches long; petioles 4—6 lines in length, 2—4 stipules in the axils; stipules petiolate ovate lanceolate; leaves long acuminate, with margins entire; rarely some few leaves have distant coarse teeth.

*Bulbostylis (Brickellia) deltoides*, s. nov.—Fruticosa, ramoso; ramis teretibus, junioribus pubescentibus; foliis utrinque glabris, oppositis, crenatodentatis, obtusis deltoideo-ovatis, petiolatis, trinervis; petiolis glanduloso-pubescentibus; floribus corymbosis axillaribus aut terminalibus; involucri squamis lineari-oblongis, laxè imbricatis: achenia tereti striato subpiloso.

Northern Texas. May.

A branching shrub, 3—4 feet high; flowers few, small and mostly terminal; petioles  $\frac{1}{2}$ —1 inch long; leaves  $1\frac{1}{2}$ —2 inches long and  $1\frac{1}{2}$  wide.

*Kuhnia macranthra*, s. nov.—Herbacea; caule 8—12 polycaris, ramoso; foliis sessilibus ovato-lanceolatis, puberulo-pubescentibus; margine integris, vel interrupto-dentatis; floribus magnis, purpureis subcorymbosis.

Northern Texas. May.

Scales of the involucre loosely imbricated, linear-oblong, the longest nearly equal in length to the flowers of the disk; leaves about an inch long; flowering stems 1—2 inches below the flowers, destitute of leaves, but furnished with linear bracts about  $\frac{1}{2}$  an inch in length.

*Erigeron Brazoense*, s. nov.—Herbaceum, ramosum, pilosum; foliis numerosis, lato-spathulatis, submucronatis, caulinis sessilibus vel breve petiolatis, radicalibus petiolatis; ligulis albis, linearibus, acutis, confertissimis, subuniseriatis, involucri duplo excedentibus; involucri squamis, linearibus, acutis, disco æquantibus.

On the waters of the Upper Brazos. May.

Plant 8—10 inches high; leaves  $1\frac{1}{2}$ —2 inches long, and the largest about  $\frac{1}{2}$  an inch wide; radical leaves mostly petioled; petioles  $\frac{1}{2}$ — $1\frac{1}{2}$  inches long; whole plant sparingly coated with white hairs, not appressed; branches numerous and erect; coated thickly with leaves to the summit.

*Erigeron (Eriger) nudiflorum*, s. n.—Hirsutum pumilum, ramosum; foliis lineari-oblongis, integris, acutis, confertissimis; ramis apice longe nudis, monocephalis; ligulis albis, plurimis, subuniseriatis, involucri duplo excedentibus, acheniis oblongis, glabris, vel parum pilosis; pappo radii et disci conformi, duplici; exteriore breve setacea.

Northern Texas. May.

Very much branched from the root. Stems erect, 4—6 inches high; leaves numerous near the root and upwards on the stems about 3 inches; the upper stems, two inches below the flowers, naked; whole plant strigose hirsute, the white hairs not appressed; flowers about  $\frac{1}{4}$  of an inch in diameter; leaves  $\frac{1}{2}$ —1 inch long and a little more than a line wide.

*Machæranthera (Dieteria) grandiflora*, s. nov.—Glabra, vel subpubescens; caule ramosissimo; foliis numerosis, superne lineari-lanceolatis, subamplexi-caulis, acutis; inferne pinnato sectis, segmentis plurimis, acutis; involucri squamis imbricatis 3—4 seriatis, lineari-oblongis, abrupte acutis, disco brevioribus; pappo rufo setaceo; acheniis obovatis, sericeis striatis, receptaculum convexum, alveolatum, alveolæ margine laceræ.

West of Fort Mason. June.

12—18 inches high; leaves alternate  $\frac{3}{4}$ —1 inch long; whole plant rigid; flowers  $\frac{3}{4}$  of an inch in diameter.

*Aplopappus linearifolius*, s. nov.—Tota glabra; caule diffuse ramosissimo, striato; foliis lineari-elongatis, sessilibusque acutis; involucri squamis, 3-serialis, lanceolatis acutis; pappo albo, setaceo, receptaculum, planum alveolatum; achenia cylindrica, striata, parum sericea.

Llano County. June.

Stems procumbent, and branches extending 1—2 feet; leaves about a line in width and an inch long, alternate and numerous; flowers few,  $\frac{1}{2}$  an inch in diameter; receptacle deeply alveolate, and margins of the cells chaffy.

*Parthenium lobatum*, s. nov.—Annua, caule herbaceo-ramoso, glanduloso; foliis sinuato-pinnatifidis, lobis obtusis et submucronatis foliis superne sessilibus; inferne petiolatis, utrinque pubescentibus, involucri squamis obtusissimis, margine valde, et minute lacineatis, acheniis sericeis, obovatis, pappo paleaceo breve aristato.

Western Texas. June.

About a foot high; flowers numerous, glomerated at the ends of the branches.

*Aphanostephus pilosus*, s. nov.—Humile, ramosissime, utrinque pilosa; foliis linearis, basi attenuatis, acutis; involucri squamis, lanceolatis, subulatis, margine membranaceis, ligulis albis, linearibus involucri duplo longioribus; acheniis teretibus, subarcuatis, striatis, pappo parvo duplo longioribus.

Prairies north of Fort Belknap. May.

3—6 inches high; leaves and flowers numerous, the flowering stems not naked or elongated, the whole plant covered with white hairs which are dilated at the base, and not appressed.

*Sericocarpus (Galatella) Woodhousii*, s. n.—Glabra, seu parum pubescens; foliis oblongo-linearis, mucronatis, subfasciculatis; receptaculum angustum, alveolatum; alveolorum marginibus lacineato-dentatis; corollæ disci, campanulato-tubulosæ, limbo profunde quinque-dentato; achenia dense strigoso-sericea, involucri squamis imbricatis, lineari-oblongis, disco brevioribus; floribus subcorymbosis numerosis.

New Mexico. Dr. Woodhouse.

Leaves somewhat fasciculated, varying in size from  $\frac{1}{2}$  an inch to 2 inches long and 1—3 lines in width, not rigid; stem about 2 feet high, with a few branches near the summit. Flowers in August.

*Lepachys serratus*, s. nov.—Valde pubescens; foliis interrupte pinnatisectis; segmentis ovatis aut lanceolatis, profunde serratis; superne sessilibus; inferne petiolatis et lyrato-sectis; involucri squamis 1-serialis longe linearis, hirsutis; discus elongatus, cylindricus, involucri vel ligulæ longior; floribus raris, longe pedunculatis.

Near Camp Colorado. June.

Several erect root-stems, 2—3 feet high, with few branches; leaves 2—4 inches long, the three terminal segments large and ovate, with large serratures; radical petioles margined with a few small mucronate lobes. Whole plant hirsutely pubescent.

#### MARGACOLA. Gen. nov.

Capitulum multiflorum homogamum; ligulis nullis; flosculis hermaphroditis tubulosis, 5-dentatis luteis; involucrum campanulatum; squamis subæqualibus, 2—3 serialis, linearis, abrupte acutis disco brevioribus; receptaculum conicum, nudum, parvum; styli rami breve, apice pubescenti; antheræ inclusæ; achenia conformia; lineari-oblonga, subquadrangulata, glabra vel parum pilosa pappo minute setuloso, coronata; 4—6 setulis minutissimis.

*Margacola parvula*.—Annua, herbacea, glabra, humile 4—6 policar. valde 1861.]

ramoso foliis alternis, integris amplexicaulis ovatis, obtusis; floribus parvis, capitibus luteis.

Southern Texas. May.

Diffusely branching from the root; flowers on branches little elongated, on which are a few small lanceolate or ovate bracts.

Grows in a marly soil, hence the name from the Latin.

LINSECOMIA. Gen. nov. HELIANTHIDÆ.

Capitulum multiflorum heterogamum; floris radii ligulatis neutris, 1-serialis disci tubulosi hermaphroditis 5-dentatis; involucri squamis 3—4 serialis, imbricatis adpressis; exteriores ovalibus subacutis, interiores lanceolatis, acutis; receptaculum convexum subalveolatum; paleis semiamplexentibus, oblongis, apice ciliatis acutis; acheniis glabris, obovatis, compressis, subquadrangulatis, biaristatis; aristis subpaleaceis, caducis.

*Linsecomia glauca*.—Glabra, glauca; foliis caulinis oppositis; lanceolatis, longe acuminatis, integris, sessilibus; radicalibus, sessilibus, aut breviter petiolatis; caulis erectis, 10—12 pollicar. parum ramosis teretis.

Near the ruins of the old Spanish Fort San Saba. Flowers last of June.

Leaves  $1\frac{1}{2}$ —3 inches long; chaff of the disk nearly as long as the tube of the corolla, which, with the achenia, is nearly encircled by a single palea; anthers small, ovate and erect; rays slightly 2-cleft; flowers yellow.

In honor of Dr. Gideon Linsecom, a Texan botanist, to whom the Academy of Natural Sciences of Philadelphia is indebted for a fine collection of Texas plants.

*Halea repanda*, s. nov.—Annuæ; scabroso pubescenti; foliis radicalibus breviter petiolatis, ovatis repando-denticulatis, superioribus longe petiolatis ovatisve trilobatis petiolis subulatis, alis 2—3-dentatis; tubo corollæ glabro; involucri squamis lato-ovatis, acutis margine albo-pubescentibus, receptaculum conicum; palæ lanceolatae acutæ pappus paleaceus; paleis ovatis subobtusis.

Near Corpus Christi. May.

Plant 1—2 feet high; flowers  $1\frac{1}{2}$ —2 inches in diameter; achenia subquadrangular, crowned with a short scaly pappus; scales oval, distinct and obtuse; petioles 1— $1\frac{1}{2}$  inches long, and leaves of nearly the same length; rays about twice the length of the involucre; flowers yellow.

*Zexmenia (Lasianthea) hispida*, s. nov.—Strigoso-hispida; foliis ovatis, dentatis, petiolatis, stipulis ovatis vel lanceolatis, pedunculis axillaribus, solitariis vel ternis, nudis seu foliis summis capitulo longioribus; involucri squamis biserialis, subæquantibus, ovatis canescenti pilosis, acutis, ligulis aureis brevissimis, acheniis oblongo-obovatis, rugosis; aristis divaricatis elongatis.

Northern Texas. May.

Plant with slender, decumbent stems, few leaves and small flowers, almost concealed by leaves at the extremity of the branches; rays scarcely longer than the involucre; leaves all with petioles 4—8 lines long; whole plant sparingly coated with white appressed hairs; palea of the disk prominent, linear, acute and equal in length to the achenia; leaves 1— $1\frac{1}{2}$  inches long and  $\frac{1}{2}$ —1 inch wide, sharply serrate and subacute; flowers 3—4 lines in diameter; achenia 3 lines long.

*Verbesina Texana*, s. nov.—Herbacea, ramoso; ramis alis foliaceis auctis; foliis alternis, ovatis, subcrenatis; petiolatis, petiolis lato-alatis, pedunculis terminalibus, multifloris, nudis, vel parum alatis; involucri squamis linearis, obtusis, acheniis radii, discique biaristatis.

Northern Texas. May.

Stems 2—3 feet high, erect and with few branches; whole plant glandular

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pubescent; leaves obtuse or subacute, the margins entire or unequally crenate; leaves 3—5 inches long; petioles 1 inch long and broadly winged.

*Actinella lanuginosa*, s. nov.—Planta densissima villosa, caule simplo aphylo; foliis radicalibus numerosis, obovatis, seu lato-spathulatis, obtusis vel subacutis, basi cuneatis, sessilibus, aut breviter petiolatis, rarisime 3-lobatis, involucri squamis lanceolatis, acutis, biserialis, pappi squamellis ovatis, longe aristulatis.

Prairies. Burnet County. April. Common.

4—6 inches high. Leaves about an inch in length and 4—8 lines broad; stem one-flowered.

*Heterotheca latifolia*, s. nov.—Scabro-villoso; caule erecto, ramoso; foliis caulinis oblongo-cordatis, amplexicaulisve sessilibus, mucronatis, margine integris seu parce et grande dentatis; foliis radicalibus breviter petiolatis, ovatis; involucri squamis scariosis, linearibus, acutis.

Llano County. June.

1½—2 feet high; branches erect, and leaves numerous, mostly clasping and entire; flowering branches little elongated and leafy, or nearly naked; expanded flowers an inch in diameter; rays many and bright yellow, twice the length of the involucre; leaves 2—4 inches long and 1—2 wide, terminating abruptly.

*Gaillardia lobata*, s. nov.—Caule ramoso, glanduloso-pubescente, foliis lyrato-5—7-lobatis, segmentis ovatis vel lanceolatis, obtusis, vel acutis; foliis caulinis sessilibus, aut breviter petiolatis; radicalibus petiolatis; involucri squamis discum superantibus, utrinque scabroso-pilosis, lanceolatis acuminatis; corollæ hermaphroditæ dentibus magnis 3-nervis, subacutis, fimbriis receptaculi crebris, acicularibus basi dilatatis; pappo radii conformi.

Southern Texas. May.

Stems 8—12 inches high, branching from the root; rays numerous and crowded, flowers 1½ inches in diameter, dark red; corolla of the disk with broad fringed subulate teeth; subulate fimbriæ longer than the achenia; leaves 1—2 inches long, the lobe at the extremity twice the length of the lateral segments; floral stems naked above, petioles of radical leaves about ½ an inch long.

*Gaillardia scabrosa*, s. nov.—Ramiisque foliis valde scabroso-pubescentibus; foliis longe lanceolatis, sessilibus, aut breviter petiolatis, acuminatis integris; involucri squamis excedentibus, lineari-lanceolatis, subulatis margine ciliatis, corollæ hermaphroditæ, dentibus lanceolatis, acutis; fimbriis receptaculi plurimis acicularibus, basi dilatatis, pappo radii conformi.

Western Texas. June.

Stems 12—18 inches long, and leafy to the summit terminated by flowers; leaves 1—1½ inches long, and 3—6 lines wide; corolla of the disk with glandular pubescent teeth; rays deeply 3-cleft, yellow with purple veins.

#### PHILIOZERA. Gen. nov.

Capitulum multiflorum radiatum, heterogamum, involucri squamis biserialis, imbricatis; squamis ovatis, acutis disco brevioribus; receptaculum parvum, nudum conicum; styli rami breve pubescente; pappo duplo, ima setacea, supra paleacea; paliis 5 ovatis, aristatis; acheniis sericeis, obovatis; ligulis uniserialis.

*Phileozero multiflora*.—Annuæ, herbacea, ramosissima; foliis linearibus, 3—6 laciniatis; segmentis lineari-elongatis; floribus plurimis, parvis, luteis capitatis.

Prairies north of Fort Belknap. May.

Plant 4—6 inches high, with numerous erect flowering branches, which are  
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destitute of leaves near the flowers; leaves about half a line wide, elongated, and 3—6-parted, with opposite or alternate segments; whole plant sparingly pubescent; flowers 3—4 lines in diameter; the lower pappus of many white hairs is at the base of, and about equal in length to the achenia; palea nearly as long as the achenia which they crown. The flowers have a resemblance to those of *Riddellia*. Name from the Greek, signifying its love of arid places.

*Heleneum (Tetrodus) Texanum*, s. nov.—Annuæ, glabra; caulibus erectis, 3—4 pedali, ramosissimis; ramis superioribus, alatis; foliis caulinis lanceolatis, integris, vel remote denticulatis, decurrentibus, capitulis parvis obovato-globosis, ligulis cuneatis trilobis parvis, disco, multum brevioribus, pappus paleaceus; paleis ovatis aristatis; involucri squamis linearis, acuminatis.

North of Fort Mason. June.

Radical leaves wanting in our specimens. Heads brownish yellow, 4 lines in diameter; rays yellow, scarcely 4 lines in length, 3-cleft, teeth acute; involucri longer than the rays; flowers many, and terminated in branches which are leafy to the summit; achenia villous.

*Cirsium Texanum*, s. nov.—Caule erecto, ramoso, 3—4 pedalis; foliis ovatis, integris; superiores amplexicaulis; radicalibus sessilibus vel breviter petiolatis; subtus dense canescenti-tomentosis, superne glabris, margine repando-dentatis, spinosis; involucri subglobosi squamis imbricatis, intimis lineari-lanceolatis, subulatis; exterioribus ovatis, lanceolatisque cuspidatis; flosculis purpureis.

Near Brady's Creek, north of Fort Mason. June.

Stems divaricately branched; flowers axillary or terminal; leaves none, or few, in the elongated flowering branches; stems tomentose, upper leaves 1—2 inches long; radical leaves 3—4 inches.

#### CAMPANULACEÆ.

*Specularia (Campanula) Linsecomia*, s. n.—Glabra; caule decumbente, parce ramoso; foliis sessilibus, lanceolatis apice attenuatis, acutis, bracteis longe linearibus; floribus axillaribus 2—5-glomeratis; calycis tubus elongata 3—5-lobis; segmentis linearis, acutis.

On Brady's Creek, north of Fort Mason. June.

Leaves alternate, 4—6 lines distant, in every axil of which flowers and bracts abound; capsules 6—8 lines long, 3-valved dehiscent on the sides; seeds smooth, elliptical. Whole plant smooth, excepting the margins of some of the leaves, which are minutely ciliate with white hairs, scarcely perceptible without the aid of a glass. Our specimens are in fruit only.

*Campanula Coloradoense*, s. nov.—Glabriusculis; caule erecto, simplo, multifloro; foliis caulinis sessilibus, lanceolatis, margine integris aut interrupte dentatis, minute ciliatis; radicalibus petiolatis, subobtusis; floribus axillaribus vel terminalibus; simplici seu duplici; bracteis linearibus, acutis; tubo calycis elongato linearis acutis; corolla profunde 5-fida subæquantibus; capsula cylindracea, 3-valvis, lateraliter sitis dehiscens; semina ellipsoidea.

On the Upper Colorado of Texas. June.

Plant 1—2 feet high; leaves few and alternate; lower stem and leaves have a few white, erect hairs; style exerted; stigmas 4—5; leaves 1—1½ inches long and about 4 lines wide.

#### ERICACEÆ.

*Arbutus Texana*, s. nov.—Arborea 20—25 pedali, glaberrima; foliis ovatis, subacutis, parce serratis; floribus capitatis, subracemosis calycibus albis,

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corolla duplo brevioribus, pubescentibusque et pedicellis; calycis laciniis ovatis acutis; corollis oblongo-ovatis glabris; filamentis inclusis ad basi lanuginosis corolla triplo brevioribus; stylus longis cylindricus, bacca rotunda, rubra.

Hills, Hays County. Flowers in March.

Fruit ripe in November, of a deep scarlet or red color; trunk and branches very smooth, brownish-red, the outer bark peeling off like *Platanus*. Wood very brittle; trunk 8—12 inches in diameter; leaves evergreen,  $1\frac{1}{2}$ — $2\frac{1}{2}$  inches long; petioles 1 inch long.

*Comarostaphylus (Arctostaphylus) glauca*, s. nov.—Subarborea, ramis teretibus, junioribus subpubescentibus; foliis oblongo-ovatis, obtusis, acute, et minute serratis, petiolatis; subtus candido-pulverulentis, supra glaucis et glabris; floribus capitatis, racemosis, crebrique bracteatis, brevissime pedicellatis; calycibus que bracteis pubescentibus; bracteis lato-ovatis, obtusis vel subacutis; corollis albis, ovatis, calyce parum excedentibus; calycis laciniis ovatis, acutis; fructus?

Western Texas.

Small trees, 15—20 feet high and 3—4 inches in diameter; leaves 2—4 inches long and  $1\frac{1}{4}$ —2 inches broad, obtuse at both ends; petioles 1— $1\frac{1}{2}$  inches long.

#### SAPOTACEA.

*Bumelia arborea*, s. nov.—Inermis; foliis obovatis, obtusis, ad basi cuneatis, breviter petiolatis; supra glabris, subtus glabris, vel parce pilosis, pedicellis axillaribus, numerosis, hirsutis, petiolum æquantibus; floribus minutis; calycis hirsutissimis sepalis, ovato, acutis, corolla parum brevioribus; corollæ 5-fidæ; drupa nigra, ellipsoidea.

Southern Texas.

Tree 40—50 feet high and 1—2 feet in diameter; leaves round, obtuse at the apex, 1—2 inches long and nearly an inch in breadth at the widest part; petioles 4—6 lines in length; leaves deep green on both sides, smooth and shining above, beneath a few white hairs on the mid rib and veins; fruit  $\frac{1}{2}$  an inch long, not healthy, and rarely tasted by any one the second time. It is called "Gum-elastic." Its wood is hard, close-grained, takes a fine polish, and is sometimes used for small articles of furniture. Flowers in May; fruit ripe in October.

#### SCROPHULARIACEÆ.

*Penstemon paniciflorus*, s. n.—Glanduloso-pubescent; foliis oppositis sessilibus, lineari-lanceolatis, margine integris, vel minute dentatis; floribus laxè paniculatis; pedunculis inequalibus, erecto-patentibus; calycis segmentis, lineari-subulatis, hirsutissimis; corollæ tubo elongato, superne constricto; filamento sterili glabro, apice dilatato; antheris glabris.

Past oak woods south of Fort Belknap. May.

Stems, several from the same root, about a foot high, sparingly branched near the summit; 3—6 pairs of leaves on a stem, which are about an inch and a half long and 2—4 lines wide; corolla tube 6—10 lines long, and mouth constricted to scarce a line in width.

*Penstemon amplexicaule*, s. n.—Glaucus, erectus; foliis caulinis, lato-ovatis, vel cordatis, integris, acutis, late amplexicaulibus; radicalibus, oblongo-ovatis, longe petiolatis; panicula elongata breve interrupte; cymis breviter pedunculatis, congestis; calycis segmentis ovatis, vel lanceolatis, acutis, margine submembranaceis; corollæ tubo parvo, superne parum dilatato; filamento sterili glabro; antheris piloso-lanatis.

About 60 miles N. E. of Camp Colorado. June.

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Stems mostly simple, 2—3 feet high; flower white, tinged with purple, 3—4 on each side, opposite, on pedicels 2—4 lines long. Cymes on the panicle 6—12 lines distant; tube of corolla about 6 lines long, and mouth 2—3 lines wide.

## ACANTHACEÆ.

*Drejera parviflora*, s. n.—*Glabriusculus*; ramis junioribus et calycibus glanduloso-pubescentibus; foliis oppositis, lanceolatis breviter petiolatis basi obtusis ad apicem attenuatis; spicis terminalibus, nudis; calyce profunde 5-fido; segmentis longe subulatis, corollæ tubo angusto calyce duplo longiore; floribus oppositis sessilibus breve interupte spicatis.

Western Texas. June.

Shrub 3—4 feet high, with slender branches; petioles about a line long; flowers 6—8 lines long; bracts lanceolate, shorter than the calyx.

## BORAGINACÆÆ.

*Lithospermum prostratum*, s. n.—*Prostrata* vel parçe *ascendenti*; caule longe ramoso; ramis paucis, scabroso-hirsutis; foliis obovatis, basi attenuatis, breviter petiolatis utrinque hirsutis et albo-punctatis; floribus axillaribus, solitariis vel duplicibus, breve pedicellatis; corolla calyce piloso longiore; nuculis albis lævissimis.

Falls of Fall River in Llano County.

Stems slender, 12—18 inches long. Whole plant sparingly coated with erect white hairs; leaves 1—3 inches long and 4—12 lines wide.

*Echinosperrnum pilosum*, s. n.—*Caule erecto, incane-piloso, ramoso*; foliis alternatis oblongo-spathulatis, obtusis, sessilibus; floribus solitariis, axillaribus, breviter pedicellatis, corolla tubo calyce breviora; nuculis rugosis; glochidiatis aculeis uniserialibus.

Hills Northern Texas. June.

Stems numerous from the root, leafy to the summit and 6—10 inches high; whole plant coated with suberect white hairs; leaves about an inch long and 3—4 lines wide.

*Echinosperrnum scabrosum*, s. n.—*Tota planta scabroso-pilosa*; caule erecto, ramoso, floribus numerosis axillaribus breviter pedicellatis; foliis sessilibus breve lanceolatis superne linearibus; lobis calycinis linearibus acutis, corolla longioribus; nuculis ovatis, aculeis glochidiatis uniserialibus.

On the Upper Colorado of Texas. June.

Stems numerous from the base, 4—6 inches high, thickly clothed with white erect hairs; leaves alternate or opposite; radical leaves 8—12 lines long; stem leaves 4—6 lines in length and 1—4 lines wide; stems leafy to the summit and full of fruit, leaves and flowers from near the base to the top.

*Eritrichium (Rutydocaryum) hispidum*, s. n.—*Caule ramosissimo dense canescenti-piloso*; foliis linearibus, sessilibus, acutis; floribus axillaribus et terminalibus breviter pedicellatis; corolla calycem hispidissimum parum superante; nuculis ovatis acutiusculis rugosis vel glabriusculis.

On the Upper Colorado of Texas. June.

Plant 3—6 inches high, with many erect branches, which are densely covered from near the base to the top with leaves, fruit and flowers; leaves 4—8 lines long and 1—2 lines wide.

## HYDROPHYLLACÆÆ.

*Nemophilla hirsuta*, s. n.—*Canescenti-hirsuta, caule decumbente, foliis caulibus sessilibus, alternis, radicalibus breve petiolatis, subpalmatis, profunde 3—5 lobatis, segmentis ovatisve oblongis acutis, pedunculis axillari-*

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busque terminalibus, folio longioribus, appendicibus calycinis lanceolatis, acutis, lobo duplo brevioribus.

Western Texas. May.

Stems 4—8 inches long; leaves about an inch in length and nearly of the same width; petioles of the radical leaves 2—4 lines long; peduncles about an inch long; flowers large, pale blue.

*Nemophilla pilosa*, s. n.—Canescenti-pilosiusculis, foliis alternatis, caulibus sessilibus, radicalibus breviter petiolatis et lyrato-pinnati-partitis, segmentis 5—15 ovatis vel lanceolatis, 2—5 acute-dentatis, racemis terminalibus laxifloris, calycinis sinibus appendicibus lanceolatis lobo triplo brevioribus, corolla profunde 5-fida rotata, calyce ciliata duplo longiore.

Austin. April.

Stems assurgent, 4—6 inches high, branching from the base; petioles of the radical leaves 4—12 lines long, and the leaves  $1\frac{1}{2}$ — $2\frac{1}{2}$  inches in length; peduncles 6—14 lines long; flowers purple.

*Phacelia (Cosmanthus) hispida*, n. s.—Hispidula, foliis dentato-lobatis, sessilibus, segmentis lato-ovatis, obtusiusculis vel lanceolatisque acutis, racemis elongatis, terminalibus, lobis calycinis linearibus, corolla brevioribus, staminibus corollam subæquantibus.

Austin. April.

Stems ascending and branching, 6—8 inches high from the base; sinuses of the lobes extending scarcely half way to the midrib of the leaves; leaves 1— $1\frac{1}{2}$  inches long; flowers blue. This plant resembles *Phacelia Purshii*, but is different in its non-fimbriate corolla, its leaves all being sessile, with smaller and more obtuse lobes; and the whole plant is much more hispidly pilose.

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#### Description of a new QUADRUMANOUS MAMMAL, of the genus MIDAS.

BY J. H. SLACK, M. D.

*Midas elegantulus*.—M. capite, collo, cauda, pedibusque nigris; pilis dorso nigris, apicibus canis; abdomine rufescente; macula verticale aureo rufescente, labiis nasique apice albis.

*Hab.*—Amazon.

Head, throat, anterior limbs, tail and hands, deep, glossy black; hairs of back, sides, and posterior limbs black, throughout most of their length tipped with white, without regular annulations; belly, breast, and internal surface of limbs bright rust color, separated by a well defined line from the black of back and external surface of limbs. Upon the back of the head is a small patch of hairs, of similar coloration to those of the back; and upon the vertex a small triangular patch of golden yellow. The lips and tip of nose are white.

This species is nearest allied to the *M. mystax Geoff.*, having, like that, the bright rust colored belly, and black body and tail, but can readily be distinguished by the ashy tips of the hairs of the back and posterior limbs, and the triangular golden spot upon the vertex; the hairs of this spot are golden throughout their entire length, in this respect resembling the *M. chrysoleles Kuhl.*, and *M. pileatus Geoff.* and *Deville*, from both of which, however, it can readily be distinguished by the color of the belly. The typical specimen was procured by Lieut. Herndon, during his exploration of the Amazon river and its tributaries. Its precise locality unfortunately being unknown. The specimen is the skin of an adult male, and is the property of the Smithsonian Institution, by the Secretaries of which it was kindly loaned me for examination.

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*Measurements.*—Head and body 11·5 in.; anterior limbs 6 in.; posterior limb 7 in.; tail to end of hairs 12·8 in.; tail to end of vertebra 11·5 in.

The following is a synopsis of the genus:—

1. Species with long hairs upon the head.
 

Pelage golden yellow, long and silky,	<i>M. rosalia</i> Geoff.
Body black; head, anterior arms and line beneath the tail golden yellow	<i>M. chrysomelas</i> Kuhl.
General color brown; sides of head naked; hands white,	<i>M. oedipus</i> Geoff.
Black, back of neck maroon,	<i>M. geoffroi</i> Puch.
  
2. Species with short hairs on the back of the head.
  - a. Lips not white.
 

Head and anterior limbs white; body and posterior feet brown; tail and abdomen ferruginous,	<i>M. bicolor</i> Spix.
General color black; dashed with reddish brown,	<i>M. tamarin nobis.</i>
	<i>Cebus tamarin</i> Link.
	<i>M. ursula</i> Geoff.
	<i>M. lacepedii nobis.</i>
Black; hands golden yellow,*	<i>Sim. lacepedii</i> Fischer.
	<i>M. rufimanus</i> Geoff.
  
  - β. Lips white.
 

General color black; beneath reddish,	<i>M. labiatus</i> , Geoff.
Back varied black and grey; limbs and tail blackish; entire top of head golden yellow,	<i>M. pileatus</i> , Is. Geoff.
Head, shoulders and tail black; body brown, sometimes with white annulations,	<i>M. mystax</i> , Spix.
	<i>M. nigricollis</i> , “
	<i>M. nigrifrons</i> Is. Geoff.
Pelage mostly black; thighs and base of tail bright maroon,	<i>M. devillii</i> , Is. Geoff.
Lips (not nose) white; top of head yellow; back yellow and black; thighs and base of tail reddish; hands black,	<i>M. weddelleri</i> , Deville.
Head black; back black, dashed with white; nape of neck, <i>external</i> and internal surface of limbs reddish; tail red at base and top, the intermediate portion black,	<i>M. flavifrons</i> , Is. Geoff.
Back black, dashed with white, without regular annulations; head black, with a triangular golden spot upon the vertex; hands and tail black; belly and internal surface of limbs bright brick red,	<i>M. illigeri</i> , Puch.
	<i>M. elegantulus</i> , Slack

\* This is the *Midas rufimanus* of Geoffroy St. Hilaire, Ann. du Mus., 1812, but had been described previously by G. Fischer, Bulletin de la Societe de Moscou, p. 23, 1806. It is curious that Isidore Geoffroy St. Hilaire, though crediting to Fischer the *Galago demidoffii*, (Catalogue des Primates, p. 81, 1853), has utterly ignored the existence of this species, though described in the same paper, upon the preceding page. The following is Fischer's description, for the work containing which I am indebted to Mr. Hansen, the Librarian of the Museum of Comparative Zoology, Cambridge, Mass.:  
*S. Lacepedii*, nigra, pedibus rufis, auriculis vellere brevi, labio superiore non deviso.

## Synopsis of the Recent Species of GASTROCHÆNIDÆ, a Family of Acephalous Mollusca.

BY GEORGE W. TRYON, JR.

Linnæus included in the genera *Serpula*, *Teredo* and *Pholas*, the curious group of shells which form the subject of this memoir; and it is not surprising that he should have made such a distribution when we recollect, that until quite recently the animals of these shells were unknown, whilst an obvious external resemblance existed between the tubes of *Gastrochæna*, *Rocellaria*, etc., and those of *Serpula* and *Teredo*, and the valves exhibited a close affinity to those of *Pholas*. The earlier conchologists, misled by these resemblances, in several instances referred to different genera the shell and tube of one species. Lamarck assigned to these shells their true position in the system. His family TUBICOLA included the various species of *Aspergillum*, *Clavagella*, *Fistulana* and *Gastrochæna*, together with *Teredo* and *Teredina*, and excluded the *Serpula*. TUBICOLA was placed in close connection with the family Pholadaria, to which it is nearly allied not only by external characters, but also by anatomical resemblances and circumstance of habitation. The Lamarckian arrangement and his genera, were adhered to by the few writers who have taken up the study of the family until within the past few years.

Dr. John Edward Gray, in a paper published in the London Zool. Proc. for 1858, entitled, "On the Families *Aspergillidæ*, *Gastrochænidæ* and *Humphreyiadæ*," proposed the following classification:—

## Family I. ASPERGILLIDÆ.

Animal living sunk in sand, or holes in rocks, or shells; enclosed in a shelly tube in which it resides, and emitting from the front of its mantle a number of tentacles, which are enclosed in tubuli radiating from the edge or disk of the base of the enclosing tube.

## Subfamily 1. PENICILLINA.

Both the valves of the adult animal imbedded in and forming part of the shelly tubular sheath. The valves of the young animals are early united into one plate.

Genera. *Warnea*, *Aspergillum*, *Penicillus*, *Clepsydra*, *Arytene*, *Fægia*.

## Subfamily 2. CLAVAGELLINA.

Only one valve of the adult animal imbedded in the shelly tubular sheath; the other free, and movable in the cavity of the tube.

Genera. *Clavagella* (fossil), *Bryopa*, *Dacosta*.

## Family II. GASTROCHÆNIDÆ.

Living sunk in sand or holes in rocks and shells; enclosed in a shelly tube, in which are contained the free, movable valves. The front of the mantle not provided with any tentacles. The tube of the adult animal closed at the base, and destitute of any slit or perforations; its siphonal end not expanded.

## Subfamily 1. CHÆNAINA.

The tube symmetrical, clavate, free. The animal living free, sunk in sand.  
Genus *Chæna*.

## Subfamily 2. GASTROCHÆNAINA.

The tube irregular, attached. The animal living in holes in rocks, shells and other marine bodies.

Genus *Gastrochæna*.

## Family III. HUMPHREYIADÆ.

The animal at first free and covered with two shelly valves, which become  
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united into a single plate, which expands on the sides and in front, forming a bag-like cavity, attached by its outer surface to shells or rocks, and, as the animal increases in size, it expands behind into a shelly tube with a circular aperture.

The front of the mantle is furnished with scattered tentacles, which are emitted through tubular pores on the upper part of the front of the tube, and round the circumference of the part by which it is attached.

The shells are attached to the surface of shells or rocks, and not sunk into their substance; nor do the animals live sunk in the sand like *ASPERGILLIDÆ* and *GASTROCHENIDÆ*.

Genus *Humphreyia*.

We have adopted several of the subfamilies and genera proposed by Dr. Gray, and have also used some of the genera as subgenera, but we do not consider the differences among these shells to be sufficient to warrant the creation of three families; nor are the genera so numerous as to require such a division for their proper study. The families proposed by Dr. Gray are not only discarded for the foregoing reasons, but also because their characters are very unequal in value. The *first*, comprising shells with both valves free, and those with but one valve free, the other attached, presents stronger differences within itself than those by which he has separated it from the *second* family; while the *third* (*HUMPHREYIADÆ*) is described as possessing a peculiar mode of growth, the tube being an enlargement or prolongation of the shelly valves. This may be true with regard to *HUMPHREYIADÆ*, but then it is also true of the genus *Brechites*, the depressious round the valves evidently marking the growth of the tube from them, as a nucleus.

Mr. Lovell Reeve, in his "Monograph of *Aspergillum*," says, in relation to *Humphreyia* :—

"If the animal of this interesting form of *Aspergillum* could speak, its remarks on Dr. Gray's ingenious description of its structure, habits and shell would probably resemble those of our great landscape painter Turner, on the criticisms of his pictures by Ruskin,—'Ah! he sees a great deal more in them than I can, or ever intended should be seen.'

"The peculiarities of *Aspergillum* (*Humphreyia*) *Strangei* are, that it is an adherent species; and, secondly, that it forms its sheath in a square. Like the shell of all other adherent species of a genus, compared with those that live free, the shell of *A. Strangei* has a very distorted growth, and the part of the attachment being the most delicate part of the shell is the part most distorted. One of the only two specimens known has, on ceasing its free habit, commenced to attach itself within the hinge portion of a muscle; the other has been attached to stone, in a manner obviously even less commodious to the symmetry of its growth; and many of the points seized by Dr. Gray as points of generic character are contortions arising out of these peculiar circumstances of habitation. The disk is smashed in as it were, and the frill is pushed out at the edge of the place of attachment, and both are an irregular heap of contortion."

The three groups or subfamilies into which we have divided the recent *GASTROCHENIDÆ*, following the arrangement given by H. and A. Adams, form very natural divisions of equal value; and the first three genera, also, are founded on constant and very distinct characters; but the division of the old genus *Aspergillum* must be regarded as a purely artificial arrangement of a large number of species into groups, in order to facilitate their study, which, in a genus so subject to distortion and abnormal mode of growth, had become very perplexing. These genera will probably undergo much modification when we have a better knowledge of their animals, which at present are almost unknown to us.

Naturalists are not all agreed as to the application of Guettard's name

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*Brechites* to *Aspergillum*. The description, it must be owned, is entirely inadequate; still, we have but little doubt that it was intended for this shell.

It is the aim of this paper to enumerate and define the various genera and species of *GASTROCHÆNIDA*, giving their synonymy in full, and also their distinctive characters. In the progress of the work, difficulties have been encountered that were scarcely imagined at the outset. The older writers have given us generally utterly inadequate descriptions, and have also in some cases confounded two or more species under one name and description,—e. g. in *Gastrochæna cuneiformis* and *Aspergillum Javanum*.

Then, again, many of the later species are founded on single or few specimens, and characterized principally by variations of surface and ornamentation, which may be found to be permanent when a larger number of specimens become known to us, but are most probably the result of accident, in a family acknowledged to be peculiarly subject to distortion from external causes. That a large number of these species could not be retained on present data, early became apparent; but the question with what forms they were to be united has sometimes proved a perplexing one. Where we have merged two or more species into one, our reasons are always stated; but they must be understood as mere opinions which future discoveries may very seriously modify.

Whilst the course we have thought proper to pursue may have resulted in the suppression of some good species, it offers us, in those which have been adopted as valid, objects distinguished from each other by well founded and permanent characters. Unusual care has been taken with the synonymy of the older species, the descriptions having been patiently studied out and compared, and it is probable that the most of them have been assigned to their true position; but for reasons already alluded to, there can be no certainty regarding this, and perhaps this paper should rather be regarded as a contribution of facts and authorities as *matériel* for the future monographer, than as an addition to positive knowledge.

It will be found by reference to the succeeding pages that we have placed in the synonymy of a number of genera and species many well known and generally received names. To explain our motive for so doing, we deem it important to enunciate the following general principle:

We hold that the oldest generic name, accompanied by a sufficiently accurate description for the purposes of identification, should always have priority; and the same rule applies to specific names; but in order to save naturalists from the labor of consulting the writings of the ancients and the danger of adopting a false application of their generally obscure descriptions, no pre-Linnæan names should be used.

The name of the naturalist who first describes a species of shell should forever remain attached to the specific name, of which, for all the purposes of memorizing or identification, it is properly a part; and should our better acquaintance with its structure and relations to other mollusca authorize its removal to another genus from that in which it was originally placed by its discoverer, then the latter's name should be followed by the word "Species," to indicate the fact.

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*Classification.*

CONCHIFERA.

PHOLADACEA.

(Family I. *PHOLADIDÆ*.)

Family II. *GASTROCHÆNIDÆ*.

*Shell*.—Valves thin, gaping, edentulous, or teeth rudimentary, ligament external, adductor impressions two, pallial line sinuated; contained within a shelly tube, both valves free, or one or both valves cemented to its walls.

*Animal*.—Symmetrical, elongated, anteriorly truncated; with two long contractile siphons posteriorly, united nearly to their extremities, which are fringed with cirrated orifices. Margins of the mantle anteriorly thickened and united, with a small pedal opening; foot cylindrical, small; gills, a pair on either side, prolonged into the branchial siphon.

Frequently gregarious; burrowing in wood, stone, sand, or mud at low water mark, and lining their burrows with a calcareous tube; the shape of which, together with the more or less cohesion of the valves to its sides, affords the generic characters.

Subfamily 1. *GASTROCHÆNINÆ*, Tryon, (not Gray.\*) 1861.

Shell with both valves free from the tube.

- a. Inequivalve, edentulous; tube straight, striated transversely, and furnished, when complete, with a perforated septum behind the valves.

1. Genus *GASTROCHÆNA*, Spengler. 1780.

*Gastrochæna*, (including *Rocellaria*.)

Spengler, Nov. Act. Soc. Sc. Havn. ii. 1780.

Blainville, Malacologie, p. 574, 1825.

Rang, Tabl. Meth. p. 342, 1829.

Deshayes, Traite Elem. i. pt. 2, p. 26, 1843—'50.

*Gastrochæna*, (as at present restricted.)

Mörch, Catalogue, 1853.

H. and A. Adams, Genera, ii. p. 334, 1856.

*Chæna*, Retzius, Nov. Test. Gen. p. 19, 1788, (including *Rocellaria*.)

Schumacher, Essai d'un Nov. Syst. p. 94, 1817, (including *Rocellaria*.)

Gray, Zool. Proc. London, p. 189, 1847.

“ “ “ “ p. 315, 1858.

Deshayes, Zool. Proc. London, p. 330, 1854.

Woodward, Manual, p. 326, 1854, (as a subgenus of *Gastrochæna*, *Rocellaria*.)

*Fistulana*, Bruguiere, Encyc. Meth. Vers. 1789.

Cuvier, Regne Anim. Ed. primo, ii. p. 494, 1817.

Lamarck, Anim. Sans. Vert. v. p. 432, 1818.

“ (Deshayes' edit.) Anim. Sans. Vert. vi. p. 25, 1835.

\* Gray's subfamily *GASTROCHÆNAINA* is made to include only the species of *Rocellaria*, (by him wrongly named *Gastrochæna*.) while the genus *Gastrochæna* he has placed, under the name of *Chæna*, in another subfamily *CHÆNAINA*. I include the two genera in one subfamily. I also include a third genus, recently proposed by Dr. Gould.

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 Bosc, Hist. Nat. des Coquilles, ii. p. 205, 1824.  
 Deshayes, Encyc. Meth. ii. p. 139, 1830.  
 Wyatt, Conch. p. 24, 1838.  
 Hanley, Descriptive Catalogue, p. 3, 1842.  
 Reeve, Conch. Syst. 1843.  
 Catlow and Reeve, Conch. Nomenc. p. 2, 1845.  
 Jay. Catalogue, 4th edit. p. 8, 1850.

Teredo, partim.

Linnæus, Gmelin, Dillwyn.

*Description*.—Valves irregular, unequal, widely gaping, hinge edentulous, ligament narrow; pallial sinus deep, posterior muscular impression nearly central, with a pedal scar in front. Tube straight, cylindrical, striated transversely, tapering upwards, closed at the lower end, with a perforated septum behind the valves.

A tropical genus, burrowing in sand or mud, at low water mark; with the upper part of the tube projecting but little above the surface.

- b. Equivalve, edentulous, but the hinge generally with a small spatulate lamina. Tube irregular.

2. Genus ROCELLARIA, Fleuriau de Bellevue. 1802.

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 Roxellaria, Agassiz, Nomenclator Zoologicus.  
 Rocellaria, Mörch, Catalogue, 1853.  
 H. and A. Adams, Genera, ii. p. 335, 1856.  
 Gastrochæna, Cuvier, Regne Anim. Ed. primo, ii. p. 490, 1817.  
 Lamarck, Anim. Sans. Vert. v. p. 446, 1818.  
 “ (Desh. edit.) Anim. Sans. Vert. vi. p. 48, 1835.  
 Ferussac, Tabl. Syst. p. 45, 1822.  
 Turton, Conch. Dithyra Brit. p. 17, 1822.  
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 Della Chiaje, Anim. Senza Vert.  
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 “ “ “ p. 316, 1858.  
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 Jay, Catalogue, 4th edit. p. 8, 1850.  
 Deshayes, Mollusques, Expl. Sci. de l'Algerie, p. 17.  
 “ Proc. Zool. Soc. London, p. 326, 1854.  
 Forbes and Hanley, Hist. Brit. Moll. i. p. 130, 1853.  
 Woodward, Manual, pt. 2, p. 325, 1854.  
 Carpenter, Mazatlan Shells, Brit. Mus. Cat. p. 14, 1857.  
 Beau, Cat. des Coq. Guadeloupe, 1858.

- Gastrochæna, (including both Gastrochæna and Rocellaria.)  
 Spengler, Nov. Act. Sc. Soc. Havn. ii. 1780.  
 Blainville, Malacol. i. p. 574, 1825.  
 Deshayes, Traite Elem. i. pt. 2, p. 26, 1843—'50.
- Chæna, (partim,) Retzius, Nov. Test. Gen. p. 19, 1788.  
 Gray, Figs. Moll. Anim. v. 1857.
- Mya, (partim,) Pennant, Brit. Zool. iv. 1777.  
 Donovan, Brit. Shells, iii. 1801.  
 Montagu, Test. Brit. i. 1803.  
 Maton & Rackett, Linn. Trans. viii. 1807.  
 Wood, Gen. Conch. edit. 1, 1815.  
 " Index Test, edit. 1, 1818; edit. 2, 1828.  
 De Gerville. Cat. des Coq. de la Manche, 1825.
- Chama, DaCosta, Brit. Conch. 1778.
- Pholas, (partim,) Chemnitz, Conch. Cab. x. 1788.  
 Gmelin, Syst. Nat. i. 1790.  
 Poli, Test. utr. Sicil. i. 1791.  
 Olivi, Adriatica, 1792.  
 Schreibers, Versuch nach Conchylien, ii. 1793.  
 Pultney, Dorsetshire Catalogue, 1799.  
 Dillwyn, Descriptive Catalogue, i. 1817.  
 Wood, Gen. Conch. ed. 1, 1815.  
 " Index Test, edit. 1, 1818; edit. 2, 1828.
- Mytilus, (partim,) Dillwyn, Descriptive Catalogue. i. 1817.
- Fistulana, (partim,) Bosc, Hist. Nat. des Coq. ii. p. 205, 1824.  
 Deshayes, Encyc. Meth. Vers. ii. p. 139, 1830.  
 Philippi, Enum. Moll. Sicil. i. p. 2, 1836.

*Description.*—Shell regular, equivalve; valves ovate or cuneiform, widely gaping anteriorly, very inequilateral; umbones anterior, ligament long and narrow. Pallial line lightly impressed, sinuated, uniting the muscular impressions.

Tube claviform or irregular, often incomplete, perforating shells and limestone, to which its walls are sometimes adherent.

### Subgenus SPENGLERIA, Tryon. 1861.

I propose to separate from Rocellaria those species which are elongate-cuneiform, truncated at the posterior end of the shell, and having a triangular space, radiating from the beaks posteriorly to the margin, elevated slightly above the general surface of the shell, and ornamented with transverse lamellæ.

### 3. Genus CUCURBITULA, Gould. 1861.

Cucurbitula, Gould, Proc. Bost. Soc. Nat. Hist. viii. p. 22, March, 1861.

Fistulana,  
 Gastrochæna, } Partim. of authors.  
 Chæna, &c. }

*Description.*—Shell regular, elongate, equivalve, gaping the whole length, anteriorly enveloped by the mantle of the animal.

Tube very short, ovate, or gourd-shaped, composed of successive calcareous layers or cups, involving bits of shell or sand. Attached by one side to shells, &c.

I quite agree with Dr. Gould in the propriety of erecting a new genus for the well known *Gastrochæna lagenula*. The characters given above prove it to be quite distinct from *Gastrochæna* or *Rocellaria*.

### Subfamily 2. BRYOPINÆ, Tryon. 1861.

Shell with the right valve only free, the left being imbedded in the tube.

## 4. Genus BRYOPA, Gray. 1840.

Bryopa, Gray, Syn. Brit. Mus. 1840.

" Proc. Zool. Soc. p. 314, 1858.

H. and A. Adams, Genera, ii. p. 649, 1858.

Clavagella,\* Lamarck, Anim. Sans. Vert. v. p. 430, 1818.

" (Desh. edit.) Anim. Sans. Vert. vi. p. 22, 1835.

Ferussac, Tabl. Syst. p. 45, 1822.

Della Chiaje, Anim. Senza Vert.

Sowerby, Genera.

Blainville, Malacol. p. 575, 1825.

Crouch, Introd. Lam. p. 5, 1827.

Rang, Man. Moll. p. 338, 1829.

Broderip, Zool. Proc. London, p. 115, 1834.

" Zool. Trans. London, i. p. 261, 1835.

Owen, " " " i. p. 269, 1835. (Anatomy.)

Cuvier, Regne Anim. (Audouin's edit.) 1836.

Th. Müller, Syn. Test. Viv. 1836.

Philippi, Weigmann's Archiv. für Naturg. i. 1840.

" Enum. Moll. Sicil. i. p. 1, 1836; ii. p. 1, 1844.

Reeve, Conch. Syst. 1843.

Hanley, Descriptive Catalogue. p. 2, 1842.

Cailliaud, Guerin's Mag. Zool. 1842.

" Chenu's Illustrations Conch.

Forbes, Report on Ægean Invert., Brit. Assoc. p. 142, 1843.

Deshayes, Traite Elem. i. pt. 2, p. 16, 1843-'50.

" Expl. Sci. de l'Algerie, Mollusques, p. 1.

Catlow, Conch. Nomenc. p. 2, 1845.

Jay, Catalogue, 4th edit. p. 3, 1850.

H. and A. Adams, Genera, ii. p. 337, 1854.

Gray, Figs. of Moll. Anim. v. 1857.

Teredo, (partim,) Brocchi.

*Description*.—Valves flat, irregular, unequal, the right free, the left always imbedded when adult. Pallial sinus deep. Anterior muscular impression small, posterior one large.

Tube elongated, cylindrical, open at the posterior end, and furnished with siphonal fringes; the anterior or lower end compressed, clavate, simple, with a minute central fissure.

Subgenus DACOSTA, Gray. 1858.

Dacosta, Gray, Zool. Proc. London, p. 315, 1858.

H. and A. Adams, Genera, ii. p. 649, 1858.

Posterior or upper end of the tube destitute of siphonal fringes.

Subfamily 3. CLAVAGELLINÆ, Gray. 1858.

Distinguished from Bryopinæ by the presence of radiated tubuli on the lower end of the tube, thus forming a connecting link between Bryopinæ and Penicillinæ.

(Contains the fossil genus Clavagella.)

Subfamily 4. PENICILLINÆ, Gray. 1858.

Shell with both valves imbedded in the walls of the tube, with their umbones visible externally. Base of the tube ornamented with radiated tubuli, containing tentacular processes originating in the animal's mantle.

\* The genus *Clavagella*, as characterized by Lamarck, includes those species (only known in a fossil state) in which the lower end of the tube is surrounded by hollow spinous processes. Lamarck included the recent species in his genus, under the impression, probably, that their tubes were incomplete.

5. Genus BRECHITES, Guettard. 1774.
- Brechites, Guettard, Mem. de l'Academie Paris, ii. p. 18, 1774.  
Mörch, Catalogue, 1853.  
H. and A. Adams, Genera, ii. p. 338, 1856.  
“ “ “ “ ii. p. 649, 1858.
- Phallus, (partim,) Lister, Historiæ Conchyliorum, 1685—'92.  
Rumphius, Amboinsche Rareit. 1705.  
Gualtieri, Test, 1742.
- Tubulus, (partim,) Bonanni, Recreatio Oculi, &c., 1684.  
Klein, Tab. Mar. Gen. 1734.  
Martini, Conch. i. 1769.
- Venus, (partim,) Rumphius, Amboinsche Rareit, 1705.  
Solen, (partim,) Klein, Ostracologicæ, p. 163, 1753.
- Arytæna, (partim,) D'Argenville, Conchyliologie, 2d ed. 1757.  
Favanne, Conch. 1780.  
Oken, Lehrbuch, p. 379, 1815.
- Penicillus, (partim,) Bruguière, Encyc. Meth. Vers. p. 126, 1789.  
Lamarck, 1801.  
Gray, Genera, Zool. Proc. p. 188, 1847.
- Clepsydra, (partim,) Meuschen.  
Schumacher, Essai d'un Nov. Syst. pp. 79 and 261, 1817.
- Serpula, (partim,) Linnæus.  
Schroeter, Einleit. Conch. ii. 1784.  
Gmelin, Syst. Nat. i. 1790.  
Born.  
Schreibers, Versuch nach Conchyl. ii. 1793.  
Dillwyn, Descriptive Catalogue, 1817.  
Wood, Index Test. edit. 1, 1818; edit. 2, 1828.  
Knorr, Vergnüg. iv. 1772.  
Martini, Conch. Cabinet, i. 1769.  
Shaw, Nat. Misc. vi.  
Brooke's Conchology, 1815.  
Mawe, Conch. 1823.  
Woodarch, Introd. 1831.
- Verpa, Boltzen, Mus. Bolt. edit. 2, 1819.
- Aquaria, Perry, Conch. 1811.
- Aspergillum, Menke, Syn. Meth. Moll. 1830.
- Arrosoir, Favanne, 1780.  
D'Argenville, 1742.  
Bruguière, Encyc. Meth. p. 126, 1789.
- Aspergillum, (partim,) Bruguière, 1789.  
Lamarck, Anim. Sans Vert. v. p. 428, 1818.  
“ (Desh. ed.) Anim. Sans Vert. vi. p. 19, 1835.  
Ferussac, Tabl. Syst. p. 45, 1822.  
Blainville, Malacologie, p. 576, 1825.  
Sowerby, Genera.  
Crouch, Introd. Lamarck, p. 5, 1827.  
Chenu, Illust. Conch. Aspergillum.  
Rang, Hist. Nat. des Moll. p. 337, 1829.  
Wyatt, Conch. p. 23, 1838.  
Cuvier, Regne Anim. (Audouin's edit.)  
Anton, Verzeich der Conchyl. p. 122, 1839.  
Reichenbach, Conchylien, 1842.  
Hanley, Descriptive Catalogue, p. 1, 1842.  
Reeve, Conch. Syst. 1843.  
“ Conchologia Iconica, Monog. Aspergillum, 1860.  
Deshayes, Traite Elem. i. pt. 2, p. 8, 1843—'50.  
Potiez et Michaud, Gallerie des Moll. ii. p. 273, 1844.

- Aspergillum, (partim,) Savigny, Expl. Egypt. Moll.  
 Guerin, Iconog. du Regne Anim.  
 Philippi, Enum. Moll. Sicil. i. p. 2, 1836; ii. p. 2, 1844.  
 Catlow, Conch. Nomencl. p. 1, 1845.  
 Ruppell, Reise Nord Afric.  
 Jay, Catalogue, p. 8, 4th ed. 1850.  
 Woodward, Manual, pt. 2, p. 327, 1854.  
 Gray, Figs. Moll. Animals, v. 1857.  
 " Zool. Proc. p. 311, 1858.

*Description.*—Shell small, oval, equivalve, equilateral, imbedded in the wall of the tube, and visible externally.

Tube elongated, attenuated and open above, swelling, and closed below by a convex diaphragm, with numerous margined perforations and a narrow central fissure; the circumference ornamented with one or more fringes of tubuli. The upper or siphonal end of the tube plain.

Surface of the tube wavy, depressed around the small pair of open valves.

Inhabiting tropical countries, and living buried in sand or mud at low water mark.

Subgenus WARNEA, Gray. 1858.

Warnea, Gray, Zool. Proc. p. 309, 1858.

H. and A. Adams, Genera, ii. p. 649, 1858.

The siphonal end of the tube fringed with from one to several rows of ruffles.

6. Genus PENICILLUS, Gray, 1858, (not Bruguiere.)

Penicillus, Gray, Zool. Proc. 312, 1858.

H. and A. Adams, Genera, ii. p. 649, 1858.

Aspergillum (partim) of authors.

*Description.*—The valves not surrounded by wavy depressions on the surface of the tube. Disk surrounded by a single fringe of tubuli.

Subgenus CLEPSYDRA, Gray, 1858, (not Meuschen or Schumacher.)

Clepsydra, Gray, Zool. Proc. p. 312, 1858.

H. and A. Adams, Genera, ii. p. 649, 1858.

Fringe of the disk consisting of two or three series of tubes.

7. Genus FÆGIA, Gray. 1840.

Fægia, Gray, Syn. Brit. Mus. 1840.

" Zool. Proc. p. 313, 1858.

H. and A. Adams, Genera, ii. p. 649, 1858.

Aspergillum (partim) of authors.

*Description.*—Valves not surrounded by wavy depressions; covered more or less by a sunken tubercle in front. Disk of the tube fringed.

Subgenus ARYTENE, Gray, 1858, (not Oken or Megerle.)

Arytene, Gray, Zool. Proc. p. 313, 1858.

H. & A. Adams, Genera, ii. 650, 1858.

Disk of the tube not fringed.

8. Genus HUMPHREYIA, Gray. 1858.

Humphreyia, Gray, Zool. Proc. London, p. 316, 1858, and Ann. and Mag. N. H. 3d ser. ii. p. 16, 1858.

H. and A. Adams, Genera, ii. p. 650, 1858.

Brechites, (Fægia,) H. and A. Adams, Genera, ii. p. 339, 1856.

Aspergillum, A. Adams, Zool. Soc. Proc. p. 91, 1852.

Reeve, Monog. Asp. Conch. Iconica, 1860.

*Description.*—The tube attached by its base to shells or stone, and much distorted in growth.

But two specimens are known, of the only species of this genus, and they are entirely too much distorted in appearance to furnish reliable characters. They exhibit, however, a close relationship to *Brechites*, etc., from which they may be distinguished by their adherence to foreign bodies. This character is sufficient to justify the separation made by Dr. Gray, under the name of *Humphreyia*; and, until we are better acquainted with these shells, it is as well to allow the genus to rest on it alone. Dr. Gray has attempted more, and incurred thereby the criticism in Reeve's Monograph, which we have already quoted.

*Species of Gastrochænidæ.\**

GASTROCHÆNA.

1. *G. agglutinans*, Deshayes, sp.

*Chæna agglutinans*, Deshayes, Proc. Zool. Soc. Lond. p. 330, 1854.

*Gastrochæna agglutinans*, H. and A. Adams, Genera, ii. p. 335, 1856.

*Description.*—“*G. vaginâ minimâ*, elongato-elavatâ, posticè valdè attenuatâ, corticè valdè et irregulariter transversim plicato, corporâ alienâ agglutinante. Testâ elongato-paulo latiore, extus ut in Solenibus bipartitâ, partè alterâ subplanâ, arcuatim striatâ, alterâ longitudinaliter tenuissime striatâ; laterè antico brevissimo, abruptè truncato, cucullato, angulo acuto circumscripto, radiatim tenue lirato, liris subgranosis; impressione musculari posticâ paulo post medianâ, minimâ; sinu pallii profundo, acutissimo.”—*Deshayes*.

*Hab.*—Zebu, Philippines. Coll. Cuming.

*Remarks.*—This shell is distinguished from *G. mumia* by its agglutinated tube, the division of the surface of the valve into two parts, and their peculiar striation. *G. grandis* has, like this species, an agglutinated tube, but its valves are carinate and sulcate, and differently formed.

2. *G. grandis*, Deshayes, sp.

*Chæna grandis*, Deshayes, Proc. Zool. Soc. Lond. p. 330, 1854.

*Gastrochæna grandis*, H. and A. Adams, Genera, ii. p. 335, 1856.

*Description.*—“*G. vaginâ elongato-elavatâ*, regulari, rectâ, transversim rugatâ, posticè attenuatâ, sabuletis in corticè agglutinante. Testâ elongato-angustâ, hiantissimâ, posticè latiore spathulatâ, ad latus anticum sensim attenuatâ; laterè antico brevissimo, subito truncato et angulo acuto distincto, in medio valdè carinato vel cristato, radiatim inæqualiter sulcato, sulcis inæqualibus novem ad decem, quinque majoribus denticulo acuto terminatis; cardine lineari, simplici; impressione musculari posticâ in medio longitudinis posita; sinu pallii profundo, acutissimo.”—*Deshayes*.

*Hab.*—Zebu, Philippine Islands. Coll. Cuming.

3. *G. mumia*, \* Spengler.

*Gastrochæna mumia*, Spengler, Nov. Act. Sc. Soc. ii. p. 174, f. 1—7, 1783.

“ Journ. Nat. Hist. Soc. Copenh. iii. p. 20, t. 2, f. 1, 1a.

Favanne, Conch. t. 5, f. k, 1780.

Deshayes, Traite Elem. p. 32, t. 2, 1843—'50.

Mörch, Catalogue, 1853.

H. and A. Adams, Genera, iii. t. xci. f. 1, 1a, 1855.

*Chæna mumia*, Retzius, Nov. Test. Gen. p. 19, 1788.

Schumacher, Essai d'un Nov. Syst. p. 94, 1817.

Woodward, Manual, t. 23, f. 16, 1854.

*Chæna tessellata*, Gray, Zool. Proc. p. 315, 1858.

\* Those species marked with a star are contained in the collection of the Academy of Natural Sciences of Philadelphia.



- Fistulana mumia, Catlow, Conch. Nomenc. p. 2, 1845.  
 Jay, Catalogue, 4th ed. p. 8, 1850.
- Fistulana clava, Lamarek, Anim. Sans Vert. v. p. 435, 1818.  
 " (Desh. edit.) Anim. Sans. Vert. vi. p. 30, 1835.  
 Cuvier, Regne Anim. 1st edit. ii. p. 494, 1817.  
 " " " (Audouin's edit.) t. 116, f. 1, a, b, c.  
 Sowerby, Genera, No. 27, f. 1—5.  
 Bosc, Hist. Nat. des Coq. ii. p. 204, 1824.  
 Blainville, Malacol. t. 81, f. 3, 1825.  
 Deshayes, Encyc. Meth. Vers. ii. p. 140, 1830.  
 Wyatt, Conch. t. 33, f. 5, 1838.  
 Reeve, Conch. Syst. t. 19, 1843.  
 Hanley, Desc. Cat. p. 3, t. 11, f. 5, 1842.
- Teredo clava, Gmelin, 3748, 1790.  
 Dillwyn, Desc. Cat. ii. p. 1090, 1817.

*Description.*—"G. vaginâ tereti clavatâ, rectâ, tenuissimâ, fragili; testæ valvis elongatis, anticè contortis, uncinatis, regulariter striato-plicatis."—*Deshayes.*

*Hab.*—India, Philippine Islands.

This is the well known type of the old genus *Fistulana*. Very excellent figures of it are given in the works of Deshayes, Cuvier, Blainville and Sowerby, quoted above.

*G. (Chæna) annulata*, Gray, B. M., *Hab.* Mozambique, Mauritius, is mentioned in the Zool. Proc. Lond. for 1858, but without description.

#### ROCELLARIA.

Considerable diversity of form exists among the species of this genus, and their separation into groups would probably facilitate their study; this we are unfortunately not able to do in a very perfect manner, in consequence of the extreme paucity of some of the descriptions. We have separated a subgenus *Spengleria*, and propose to divide the remaining species into two groups.

1st. Those whose shells are short and ovate. Ex *R. dubia*, *hians*, etc.

2d. Those possessing elongate-cuneiform shells. Ex *R. apertissima*, etc.

It has been proposed to create a separate genus or subgenus for those species possessing a large spatulate hinge lamina, and it is not at all improbable that future researches will show the necessity for such division. It will be seen that in a majority of the species the anterior hiatus is very long, equalling the entire, or nearly the whole length, of the shell. There are marked exceptions to this, however, in several species, the hiatus in *R. humilis*, for instance, scarcely reaching to the middle of the shell. The umbones are always placed near the anterior margin, and they are sometimes terminal. Differences also occur in the width, length, prominence and color of the ligament, in the contour of the margins, in the relative proportions of the sides anterior and posterior to the beaks, the form of the hiatus, character of the striation, the thickness of the valves, the size of the spatulate hinge lamina, (which is generally minute or obsolete,) and in the form of the interior impression.

##### a. Valves short, ovate.

1. *R. brevis*, Sowerby, sp.

- Gastrochæna brevis*, Sowerby, Zool. Proc. Lond. p. 21, 1834.  
 Th. Müller, Syn. Test. Viv. p. 335, 1836.  
 Hanley, Desc. Cat. p. 11, 1842.  
 Catlow, Conch. Nomenc. p. 2, 1845.

*Rocellaria brevis*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description.*—"R. testâ breviter ovatâ, tenui, pellucidâ, striatâ, striis exilissimis; longitudinè lateris antici octavum partim testæ æquante. Long. 0·8. lat. 0·5, alt. 0·5, poll."—*Sowerby.*

1861.]

*Hab.*—"Ad Insulas Gallapagos et apud Insulam Lord Hood's dictam. Found in pearl oysters, in from three to seven fathoms."—*Sowerby*.

2. *R. denticulata*, Deshayes, sp.

*Gastrochæna denticulata*, Deshayes, Zool. Proc. Lond. p. 327, 1854.

*Rocellaria denticulata*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description.*—"R. testâ ovato-ventricosâ, brevi, solidulâ, latâ, hiantissimâ, hiatu ovato, lato, infernè attenuato et tertiam partem posticam testæ attigente; valvis subtrapezoidalibus transversim striato-lamellosis, in laterè antico striis imbricatis, crispato-denticulatis, in laterè postico erectis, distantioribus; laterè antico satis elongato, recto, in suturâ cristato; umbonibus tumidulis, subumbilicatis; ligamento angusto, elongato, fulvo."—*Deshayes*.

*Hab.*—Columbia. Coll. Cuming.

This is a heavy shell, while *R. brevis* is thin and pellucid. It is also more prominently striated than that species, and differs from it in shape.

3. *R. dubia*,\* Pennant, sp.

*Mya dubia*, Pennant, Brit. Zool. iv. p. 82, t. 44, f. 19, 1777.

Donovan, British Shells, iii. t. 108, 1810.

Maton and Rackett, Linn. Trans. viii. p. 33, 1807.

Wood, Gen. Conch. p. 102, t. 25, f. 2, 3, 1815.

" Index Test, edit. 1, p. 11, 1818.

" " " edit. 2, t. 2, f. 23, 1828.

Gerville, Cat. des Coq. de la Manche, p. 10, 1825.

*Mya Pholadia*, Montagu, Test. Brit. i. p. 28 et 559, et supp. p. 20, 1803.

Fleming, Edinb. Encyc. ii. p. 87.

*Chama parva*, DaCosta, Brit. Conch. p. 234, 1778.

*Pholas faba*, Pultney, Dorsetshire Catalogue, p. 27, 1799.

*Pholas pusilla*, Poli, Test. utr. Sicil. i. p. 50, t. 7, f. 12, 13, 1791.

Olivi, Adrit. p. 93, 1792.

*Mytilus ambiguus*, Dillwyn, i. p. 304, 1817.

Balano miuimo, Ginanni, Op. post. ii. p. 35, t. 23, f. 164, 1755—'57.

*Gastrochæna Pholadia*, Turton, Conch. Dithyra Brit. p. 18, t. 2, f. 3, 9, 1822.

Lukis, Loudon's Mag. Nat. Hist. vi. p. 404, f. 52, 1833.

Brown, Illust. Brit. Conch. 2d ed. p. 116, t. 48, f. 13, 14, 1844.

*Gastrochæna hians*, Fleming, Brit. Anim. p. 458, 1828.

*Gastrochæna cuneiformis*, Philippi, Enum. Moll. Sicil. i. p. 2, 1836.

*Gastrochæna Poli*, Philippi, Enum. Moll. Sicil. ii. p. 3, 1844.

Requier, Cat. des Coq. de la Corse, p. 13, 1848.

*Gastrochæna (Chæna) faba*, Gray, Figs. Moll. Anim. v. p. 28, t. 339, f. 2, 3, 4; t. 347, f. 6—8, 1857.

*Gastrochæna modiolina*, Lamarck, Anim. Sans Vert. v. p. 447, 1818.

" (Desh. edit.) Auim. Sans Vert. vi. p. 49, 1835.

Sowerby, Genera, f. 1, 2, 1820—'24.

" Conch. Manual, f. 52, 1842.

Crouch, Introd. Lamarck, t. 2, f. 12, a, b, 1827.

Bouchard-Charreaux, Moll. Boulonnais, p. 8, 1829.

Collard de Cherres, Cat. Test. Mar. p. 9, 1830.

Hanley, Desc. Cat. p. 10, 1842.

Cailliaud, Guerin's Mag. Zool. Moll. p. 2, t. 69, 70, 71, 1843.

Reeve, Couch. Syst. t. 50, f. 1, 2, 1843.

Potiez et Michaud, Galerie des Moll. ii. p. 268, 1844.

*Gastrochæna modiolina*, Thorpe, Brit. Mar. Conch. p. 33, 1844.  
 Jay, Catalogue, 4th ed. p. 9, 1850.  
 Leach, Moll. Great Britain, p. 256, t. 3, f. 3, 1852.  
 Forbes and Hanley, Brit. Moll. i. p. 132, t. 2, f. 5—8, and t. F, f. 5, (animal,) 1853.  
 Woodward, Manual, pt. 2, t. 23, f. 15, 1854.  
 Gray, Proc. Zool. Soc. Lond. p. 316, 1858.

*Gastrochæna dubia*, Philippi, Wiegmann's Archiv. Natur. t. 7, f. 1, 1845.  
 Catlow, Conch. Nomenc. p. 2, 1845.  
 Deshayes, Expl. Sci. de l'Algerie, Moll. p. 34.  
 " Traite Elem. i. pt. 2, p. 34, t. 2, f. 4, 5, 1843—'50.

*Rocellaria dubia*, H. and A. Adams, Genera, iii. t. xci. f. 2, a, b, c, 1855.

*Description*.—"R. vaginâ pyriformi, contortâ, crassâ intus, ad aperturam bicarinatâ; testâ ovato-oblongâ, angustâ, transversim striatâ, anticè sinuatâ; natibus prominulis, laterè antico brevissimo."—*Deshayes*.

*Hab.*—England, Mediterranean.

This species may be readily distinguished from the others by the slight truncation of the margin at the posterior end of the shell, by its short, wide hiatus, and its large laminar hinge plate.

There are many excellent figures in the list of works quoted above, and a very full description is contained in the "British Mollusca" of Messrs. Forbes and Hanley.

4. *R. hians*,\* Chemnitz, sp.

*Pholas hians*, Chemnitz, x. p. 364. t. 172, f. 1678 and 1679. 1788.

Gmelin, Syst. Nat. 3217, 1790.

Schreibers, Versuch nach Conch. ii. p. 367, 1793.

Dillwyn, Desc. Cat. i. p. 39, 1817.

Wood, Gen. Conch. p. 85, 1815.

" Index Test, 1st ed. p. 9, 1818.

" " " 2d ed. t. 2, f. 11, 1828.

*Fistulana rupestris*, Bose, Hist. Nat. des Coq. ii. p. 205, 1824.

*Chæna cuneiformis*, Retzius, Nov. Test. Gen. p. 19, 1788.

*Gastrochæna cuneiformis*, Spengler, Nov. Act. Sc. Soc. ii. p. 179, f. 8—11, 1783.

Lamarck, Anim. Sans Vert. v. p. 447, 1818.

" (Desh edit.) Anim. Sans Vert. vi. p. 49, 1835.

Rang, Tabl. Meth.

Sowerby, Genera, f. 3, 4, 5, 1820—'24.

Blainville, Man. de Malacol. p. 574, t. 79, f. 5, 1825.

Anton, Verzeich der Conchyl. p. 1, 1839.

Hanley, Desc. Cat. p. 10, 1842.

Reeve, Conch. Syst. t. 20, f. 4, 5, 1843.

Potiez et Michaud, Gallerie des Moll. ii. p. 267, 1844.

Catlow, Conch. Nomenc. p. 2, 1845.

Jay, Catalogue, 4th ed. p. 8, 1850.

D'Orbigny, Sagra's Hist. de l'Isle de Cuba, Moll. p. 228, 1853.

Beau, Cat. des Coq. Guadeloupe, p. 27, 1858.

*Gastrochæna hians*, Gray, Zool. Proc. Lond. p. 316, 1858.

*Rocellaria hians*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ ovatâ, cuneiformi, tenui, albidâ, subpellucidâ, concentricè densè striatâ, laterè anali elongato, rotundato; laterè anali brevi, angustato, acuminato; laterè palleali hiantè."—*D'Orbigny*.

*Hab.*—West Indies.

This species is represented by Chemnitz's figures, Nos. 1678 and 1679. Nos. 1680 and 1681 represent *R. rostrata*. Several writers have confounded the two under one description, although they are really very different. *R. hians* has also been frequently confounded with *R. dubia* of Europe.

5. *R. humilis*,\* Deshayes, sp.

*Gastrochæna humilis*, Deshayes, Proc. Zool. Soc. Lond. p. 327, 1854.

*Rocellaria humilis*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ parvâ, elongato-ovatâ, tumidâ, tenui, albâ, hyalinâ, fragili, aperturâ anticâ ovato-acuminatâ, dimidiam partem testæ vix æquante, oblique sectâ et rectilineâ; valvis subtrapezoidalibus, regulariter striato-sublamellosis, striis continuis, antice approximatis, in medio paulo distantioribus et prominentioribus; umbonibus tumidulis, approximatis; laterè antico brevissimo, in suturâ cristatâ, parum obliquo; ligamento angusto, elongato, nigro."—*Deshayes*.

*Hab.*—Philippines, Zebu, (Cuming.) West Indies? Mus. Brit., Gray.

The hiatus in this species scarcely reaches to the middle of the shell, whilst it is not less than two-thirds the total length in any other species.

6. *R. hyalina*, Sowerby, sp.

*Gastrochæna hyalina*, Sowerby, Zool. Proc. p. 22, 1834.

Th. Müller, Syn. Test. Viv. p. 236, 1836.

Hanley, Desc. Cat. p. 11, 1842.

Catlow, Conch. Nomencl. p. 2, 1845.

*Rocellaria hyalina*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ ovali, albidâ, hyalinâ, lævi, dorso longitudinaliter striato; laterè antico brevi; hiatu duos trientes testæ æquante. Long. 0·55, lat. 0·25, alt. 0·3 poll."—*Sowerby*.

*Hab.*—Lord Hood's Isle.

Sowerby's descriptions of species in this genus are entirely too short and indefinite for satisfactory recognition. Having no specimens, we are not able to give any opinion regarding the validity of his species, and therefore we are compelled to insert them with the original Latin descriptions.

7. *R. intersecta*, Deshayes, sp.

*Gastrochæna intersecta*, Deshayes, Zool. Proc. London, p. 327, 1854.

*Rocellaria intersecta*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ ovato-oblongâ, brevi, cuneiformi, tenui, fragili, candidâ, oblique hiante, hiatu ovato, acuminato, dimidiam partem testæ æquante, valvis subspathulatis, anticè angustis, posticè dilatatis, striatis, striis anticis regularibus extremitate detectis, æquidistantibus, arcuatis et in medio evanescentibus et medianis interpositis, striis medianis inæqualibus, majoribus distantibus; laterè antico brevissimo, fere nullo; umbonibus minimis, subterminalibus."—*Deshayes*.

*Hab.*—? Coll. Cuming.

8. *R. lævigata*, Deshayes, sp.

*Gastrochæna lævigata*, Deshayes, Zool. Proc. Lond. p. 326, 1854.

*Rocellaria lævigata*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ ovato-cuneiformi, tenui, pellucidâ, fragili, candidissimâ, ventricosâ, latè hiantè, hiatu cordiformi, dimidiam partem testæ superante; valvis lævigatis; laterè antico striis aliquibus regularibus, ad mediam partem arcuatis et evanescentibus; umbonibus minimis, obliquis, approximatis, laterè antico brevissimo, recto."—*Deshayes*.

*Hab.*—? Coll. Cuming.

9. *R. macroschisma*, Deshayes, sp.

*Gastrochæna macroschisma*, Deshayes, Proc. Zool. Soc. p. 326, 1854.

*Rocellaria macroschisma*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ ovatâ, brevi, ventricosâ, tenui, fragili, candidâ,

anticè hiantissimâ, hiatu subcordiformi, lato, obliquo, et fere totam altitudinem testæ æquante; valvis trapezoidalibus, tenuissime striatis, striis in laterè antico tenuissimus, appressis, in medio distantioribus, erectis, sublamellosis; laterè postico obtuso, supernè in suturâ cristato; umbonibus tumidis, posticè depressiusculis, laterè antico brevi, recto; sinu pallii parum profundo, apicè acuto, triangulari, subæquilaterali."—*Deshayes*.

*Hab.*——? Coll. Cuming.

10. *R. ovata*, \*Sowerby, sp.

*Gastrochæna ovata*, Sowerby, Zool. Proc. p. 21, 1834.

Th. Müller, Syn. Test. Viv. p. 235, 1836.

Hanley, Desc. Cat. p. 10, t. 9, f. 42, 1842.

Catlow, Conch. Nomenc. p. 2, 1845.

Jay, Catalogue, 4th edit. p. 9, 1850.

Carpenter, Mazatl. Shells, Brit. Mus. Cat. p. 15, 1857.

*Rocellaria ovata*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description.*—"R. testâ ovatâ, albicanâ, longitudinaliter striatâ, striis exilibus, lamellosis, formam marginis semper sequentibus; longitudinè lateris anticî quintam partem testæ æquante. Long. 1·2, lat. 0·7, alt. 0·7 poll."—*Sowerby*.

*Hab.*—In Sinu Panamensi (Isle of Perico) et ad Insulam Platæ. Found in spondyli at the Isle of Perico, and in coral rocks, at a depth of seventeen fathoms, at the Island of Plata. Also inhabits St. Thomas Harbor, W. I., (Coll. A. N. S.) and Charleston Bay, S. Carolina! (Coll. Smithsonian Inst.)

The great difference in the relative length of the anterior and posterior sides will readily distinguish this species from *R. brevis*. *R. dubia* has a slight truncation of the posterior margin of the valves, while this species is always rounded posteriorly. The absence of the laminar hinge-plate and the length of the hiatus also separate this shell from both *R. dubia* and *R. hians*.

I have made a very close comparison between specimens from Panama and those from the West Indies and Charleston, without detecting the slightest difference between them. The Charleston specimens were collected by Dr. Wm. Stimpson.

11. *R. pupina*, *Deshayes*, sp.

*Gastrochæna pupina*, *Deshayes*, Proc. Zool. Soc. Lond. p. 326, 1854.

*Rocellaria pupina*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description.*—"R. vaginâ crassâ, brevi, clavatâ, transversim articulatâ, lævigatâ, nullâ corporâ alienâ agglutinante, in cavitate valvulæ affixa. Testâ minimâ, tenui, albâ, hyalinâ, hiantissimâ, hiatu amplissimo quasi testæ per mediam partem resecto, oblique inæqualiter bipartitâ, coarctatâ, extremitate posticâ clausâ, obtusâ, attenuatâ; laterè antico satis longo, incumbente, cucullato; umbonibus prominulis, oblique terminalibus; valvis lævigatis, posticè suturâ brevi, carinatâ; margine aperturæ dorsali, parallelo."—*Desh.*

*Hab.*—Morton Bay. Coll. Cuming.

12. *R. rugulosa*, Sowerby, sp.

*Gastrochæna rugulosa*, Sowerby, Zool. Proc. Lond. p. 22, 1834.

Th. Müller, Syn. Test. Viv. p. 235, 1836.

Hanley, Desc. Cat. p. 11, 1842.

Catlow, Conch. Nomenc. p. 2, 1845.

*Rocellaria rugulosa*, H. & A. Adams, Genera, ii. p. 336, 1856.

*Description.*—"R. testâ oblongâ, albidâ, striatâ, rugulosâ, striis anticis marginem hiantem confertis, acutis; hiatu longissimo. Long. 0·8, lat. 0·3, alt. 0·4 poll."—*Sowerby*.

*Hab.*—"Ad Insulas Gallapagos et apud Insulam Lord Hood's dictam."—*Sowerby*.

1861.]

## b. Valves elongate-cuneiform.

Hiatus, equalling the whole length of the shell, a pertissima, impressa, lamellosa, Rüppellii, spathulata, Stimpsonii, tenera.

“ nearly the entire length of the shell, cucullata, difficilis, interrupta.

“ about two-thirds the length of the shell, indistincta, Philippinensis.

## 13. R. a pertissima, Deshayes, sp.

Gastrochæna apertissima, Deshayes, Zool. Proc. p. 326, 1854.

Rocellaria apertissima, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—“R. testâ elongatâ, cuneiformi, inflatâ, tenui, fragili, per totam altitudinem testâ antice inferneque hiantissimâ, albâ, tenui, pellucidâ, anticè brevissimâ, marginè inferiorè ferè recto, posteriorè obtuso, convexo, superiore paulo obliquo; valvis tenuissimè striatis, striis in laterè antico transversalibus, in medio secundum lineam obliquam fractis, in areâ superiorè armatis, pluribus majoribus, subæquidistantibus; ligamento angusto, elongato, nigrescente.”—*Deshayes*.

*Hab.*—Philippines. Coll. Cuming.

## 14. R. cucullata, Deshayes, sp.

Gastrochæna cucullata, Deshayes, Zool. Proc. p. 329, 1854.

Rocellaria cucullata, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—“R. testâ elongato-cuneiformi, tenui, albâ, fragili, suberetacæâ, extremitate anticâ brevissimâ, posticâ compressâ, dilatâ, spathuliformi, antice inferneque oblique hiante, apertura lateraliter coarctata, ferè totam longitudinem testæ æquante, latere antico angusto, incumbente, cucullato; valvis extus in tres areas divisas, primâ anticâ obsolete striatâ, medianâ latiore, irregulariter arcuatim striato-rugosâ, tertiâ circâ ligamentum angustiorè, levigatâ; umbonibus tumidulis, terminalibus; ligamento satis prominulo, elongato, fusco.”—*Deshayes*.

*Hab.*—West Indies. Coll. Cuming.

## 15. R. difficilis, Deshayes, sp.

Gastrochæna difficilis, Deshayes, Zool. Proc. Lond. p. 328, 1854.

Rocellaria difficilis, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—“R. testâ elongato-transversâ, ovatâ, cuneiformi, compressiusculâ, obliquè longè hiantè, hiatu ovato-oblongo, infernè attenuato, ferè totam longitudinem testæ æquante; valvis trapezoidalibus, tenuè striatis; striis tenuissimis, erectis, angustissimis, in laterè antico conertioribus; umbonibus minimis; laterè antico brevissimo, recto; ligamento elongato, rufo, angusto.”—*Deshayes*.

*Hab.*—Western India. Coll. Cuming.

## 16. R. impressa, Deshayes, sp.

Gastrochæna impressa, Deshayes, Zool. Proc. p. 327, 1854.

Rocellaria impressa, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—“R. testâ elongato-cuneiformi, subovatâ, inflatâ, antice inferneque amplissimè apertâ; hiatu totam longitudinem testæ æquante, margine lateraliter oblique arcuato, anticè angusto; valvis tenuibus, subtrapezoidalibus, in medio sulco vix impresso bipartitis, partè anticâ tenuè transversim striatâ, striis in sulco subfractis, partè posticâ arcuatim et irregulariter sulcato-striatâ, in laterè postico striis oblique ascendentibus; umbonibus tumidulis, posticè obtusè subangulatis, ferè terminalibus; ligamento angustissime, elongato, partim immerso.”—*Deshayes*.

*Hab.*—? Coll. Cuming.

## 17. R. indistincta, Deshayes, sp.

Gastrochæna indistincta, Deshayes, Zool. Proc. p. 328, 1854.

Rocellaria indistincta, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ ovato-elongatâ, angustâ, cuneiformi, tenui, albâ, oblique truncatâ, elongato-hiantè, hiatu elongato, acuminato, anguscusculo, usque ad tertiam partem posticam testæ attingente, transversim striatâ, striis anticè tenuibus, regularibus, sublamellosis, erectis, in medio paulo distantioribus, et minus regularibus in areâ posticâ tenuissimis; areâ posticâ elongato-angustâ, angulo obtuso-distinctâ; laterè antico brevissimo, ligamento angustissimo, partim infosso, breviusculo."—*Deshayes*.

*Hab.*—Singapore. Coll. Cuming.

18. *R. interrupta*, *Deshayes*, sp.

*Gastrochæna interrupta*, *Deshayes*, Zool. Proc. p. 329, 1854.

*Rocellaria interrupta*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ elongato-angustâ, convexiusculâ, extremitatibus ferè æqualiter latâ, per longitudinem quasi excisâ, latè apertâ; hiatu longissimo, ovato, oblongo, inferne vix acuto, et fere totam longitudinem testæ æquante; valvis oculo nudo lævigatis, sublentè argutissime striatis, striis obsolete, distantibus, incrementi distantibus, subcontabulatis, interruptis; marginè inferiorè recto, superiorè fere parallelo, umbonibus minimis, subterminalibus; laterè antico brevi, inclinato; ligamento angustissimo, brevi."—*Deshayes*.

*Hab.*—Philippines. Coll. Cuming.

19. *R. lamellosa*, *Deshayes*, sp.

*Gastrochæna lamellosa*, *Deshayes*, Zool. Proc. p. 328, 1854.

*Rocellaria lamellosa*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ elongato-angustâ, tenui, fragili, candidâ, hyalina, compressiusculâ, longè hiantè, margine antice paululam excavato, in medio convexo, hiatu longissimo, inferne valdè attenuata, ferè totam altitudinem testæ æquante; valvis anticè valdè attenuatis, rostratis, posticè obtusis, rotundatis, anticè tenuissimè striatis, striis erectis, appressis, in medio distantioribus, breviter lamellosis, eleganter armatis, regularibus; umbonibus minimis, approximatis, subumbilicatis; laterè antico brevissimo, subrostrato; ligamento angustissimo, nigro."—*Deshayes*.

*Hab.*—Philippines, Zebu. Coll. Cuming.

20. *R. Philippinensis*, *Deshayes*, sp.

*Gastrochæna Philippinensis*, *Deshayes*, Zool. Proc. Lond. p. 328, 1854.

*Rocellaria Philippinensis*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ elongato-angustâ, subovatâ, compressiusculâ, tenui, albâ, anticè inferneque obliquè hiantè, hiatu ovato, inferne acuminato, dimidiam partem testæ paulo superantè; valvis tenuè striato-lamellosis; striis arcuatis, secundum peripheriam valvarum anticè tenuibus, approximatis, in medio latioribus, sublamellosis; marginè superiorè postico paulo carinato; umbonibus minimis; laterè antico brevi, recto, subrostrato."—*Deshayes*.

*Hab.*—Philippines, Zebu. Coll. Cuming.

21. *R. Ruppellii*, *Deshayes*, sp.

*Gastrochæna Ruppellii*, *Deshayes*, Zool. Proc. Lond. p. 328, 1854.

*Rocellaria Ruppellii*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ elongato-ovatâ, solidulâ, turgidulâ, candidâ, anticè oblique hiantè; hiatu ovato, latè, inferè attenuato, ferè totam altitudinem testæ æquante; valvis densè striatis, striis obtusis, anticè satis regularibus, appressis, in medio et laterè postico distantioribus, irregularibus, obtusis; umbonibus tumidulis; laterè antico brevi, recto, anticè parum inflexo; ligamento prælongo, angusto."—*Deshayes*.

*Hab.*—Red Sea. (Rüppell.) Coll. Cuming.

1861.]

22. *R. spathulata*, Deshayes, sp.

*Gastrochæna spathulata*, Deshayes, Zool. Proc. p. 329, 1854.

*Rocellaria spathulata*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ elongato-angustâ, cuneiformi, compressiusculâ, tenui, fragili, albâ, anticè longe hiante, hiatu fere totam longitudinem testæ æquante, inferne sensim attenuatâ; valvis anticè angustis, posticè latoribus, spathulatis, irregulariter striatis, striis lateris anticî tenuioribus, magis regularibus, rectis, in medio rugulosis, arcuatis, inæqualibus, umbonibus minimis, acutis, ferè terminalibus; laterè antico brevissimo; ligamento elongato, angusto, fusciscente; sinu pallii angustissimo, acuto, profundissimo, usque umbones versus ascendente."—*Deshayes*.

*Hab.*—Philippines, Bohol. Coll. Cuming.

23. *R. Stimpsonii*, Tryon.

*Description*.—"R. testâ elongato-angustâ, albâ, extremitate anticâ brevissimâ, acuminatâ; valvis concentrice dense striatis; umbonibus prominulis, ferè terminalibus; hiatu anguste-elongatâ, ferè totam longitudinem testæ æquante; marginè anteriore et posteriore fere parallelis. Long. .62, lat. .24, poll.

*Hab.*—Beaufort Harbor, N. C. Wm. Stimpson, M. D. Coll. Smithsonian Institution.

The above description is drawn up from a single valve obtained by Dr. Stimpson in the harbor of Beaufort, N. C. It is so very different from the other species of *Rocellaria* found on our Southern Coast and in the West Indies, that I have not hesitated in regarding it as new. The great length of the valve in proportion to its breadth, and the nearly parallel margins, distinguish it from *R. ovata* and *R. hians*. In the latter, the beaks are more nearly terminal. *R. dubia* of Europe, besides the above differences, has a truncated posterior end, whilst this is regularly rounded; and all the above species are much more inflated, with a wider hiatus, than in *R. Stimpsonii*.

The hinge exhibits small but well marked laminæ.

24. *R. tenera*, Deshayes, sp.

*Gastrochæna tenera*, Deshayes, Zool. Proc. p. 327, 1854.

*Rocellaria tenera*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ elongato-angustâ, tenui, pellucidâ, compressiusculâ, anticè angustâ, posticè paulo latorè, subdilatatâ, anticè apertissimâ, hiatu totam altitudinem æquante, lateraliter paulo sinuoso; valvis anticè inæqualiter tenuè striatis, in medio distanter arcuato-subplicatis; umbonibus tumidulis, subterminalibus; laterè antico brevi, subhorizontali, in suturâ cristato, et emarginato; sinu pallii magno, profundo, triangulari, apicè acutissimo, basi lato."—*Deshayes*.

*Hab.*—Philippines. Coll. Cuming.

## Subgenus SPENGLERIA.

25. *R. Mytiloides*,\* Lamarck, sp.

*Gastrochæna Mytiloides*, Lam. Anim. sans Vert. v. p. 447, 1818.

" (Desh. ed.) Anim. sans Vert. vi. p. 49, 1835.

Hanley, Desc. Cat. p. 10, t. 9, f. 37, 1842.

Catlow, Conch. Nomenc. p. 2, 1845.

*Rocellaria Mytiloides*, H. and A. Adams, Genera, ii. p. 336, 1856.

(No name.)

Rumphius, Amboinsche Rarit. t. 45, f. P, 1705.

*Description*.—"R. testâ ovatâ; valvis areâ longitudinali pyramidatâ distinctis; rugis transversis, fuscis."—*Lamarck*. 1½ inch long.

*Hab.*—Isle of France.



26. *R. plicatilis*, Deshayes, sp.

*Gastrochæna plicatilis*, Deshayes, Zool. Proc. Lond. p. 329, 1854.

*Rocellaria plicatilis*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ elongato-ovatâ, tenui, fragili, pellucidâ, compressiusculâ, longè hiantè, posticè truncatâ, hiatu maximo, elongato, totam altitudinem testæ æquante, infernè sensim attenuatâ; valvis in tres areas divisis, unâ anticâ latâ, transversim regulariter striatâ, striis tenuissimis, oblique sublente striolatis, parte secunda oblique medianâ, angustâ, lævigatâ, posticâ pyramidatâ, prominentiore, sulcis depressiusculis circumdatâ, transversim profundè sulcatâ, quasi scalariformi, areâ circâ ligamentum planulatâ, elongato lanceolatâ, ligamento crasso, elongato."—*Deshayes*.

*Hab.*—Philippines, Zebu. Coll. Cuming.

27. *R. rostrata*,\* Spengler, sp.

*Gastrochæna rostrata*, Spengler, Nov. Act. Sc. Soc. ii. 1783.

*Gastrochæna callosa*, Philippi, Weigmann's Archiv, 1845.

*Gastrochæna Chemnitziana*, D'Orbigny, Sagra's Cuba, Moll. p. 229, t. 29, f. 29, 30.

Beau, Cat. Coq. Guadeloupe, p. 27, 1858.

*Rocellaria rostrata*, Mörch, Catalogue, 1853.

H. and A. Adams, Genera, ii. p. 336, 1856.

*Pholas hians*, (partim,) Chemnitz, x. f. 1680—'81, 1788.

*Description*.—"R. testâ oblongo-cuneatâ, tenui, albidâ, concentricè striatâ, areâ anali longitudinali pyramidatâ, externè sulcatâ, plicis transversis rectis ornatâ; laterè anali elongatâ, transversim truncato; laterè buccali angustato, obtuso; hiatu magno. Long. 24 mill."—*D'Orbigny*.

*Hab.*—West Indies.

This species is distinguished from *R. truncata* by its large transverse lamellar ribs, their place being occupied in the latter species by coarse striæ. The anterior margin of *R. rostrata* is also more convex and not emarginate and the portion of the shell anterior to the umbones is wide, and not acuminate as in *R. truncata*.

It resembles *R. mytiloides*, but may be distinguished, according to D'Orbigny, by the "*cotes anales plus droites, son sillon lateral bien plus prononce, et ses stries plus regulieres*." The specimens of the two species in the collection of the Academy, though authentic, do not exhibit sufficient distinctive characters to clear the mind from all doubt, though the probability is that they are properly separated.

28. *R. truncata*,\* Sowerby, sp.

*Gastrochæna truncata*, Sowerby, Zool. Proc. Lond. p. 21, 1834.

Th. Müller, Syn. Test. Viv. p. 235, 1836.

Hanley, Desc. Cat. p. 10, t. 9, f. 40, 1842.

Catlow, Conch. Nomenc. p. 2, 1845.

Jay, Catalogue, 4th edit. 1850.

Carpenter, Mazatlan Shells, Brit. Mus. Cat. p. 14, 1857.

*Rocellaria truncata*, H. and A. Adams, Genera, ii. p. 336, 1856.

*Description*.—"R. testâ oblongâ, posticè rotundato-truncatâ, striatâ, sordidè albicantè; epidermidè tenui lamellosâ, posticè tectâ; laterè antico brevissimo, subacuminato. Long. 1.4, lat. 0.7, alt. 0.7, poll."—*Sowerby*.

*Hab.*—In Sinn Panamensi, (Isle of Perico.) Found in Spondyli.

This is a very distinct species, and is well authenticated both by the numerous specimens existing in cabinets, and by Mr. Carpenter's excellent description. The original diagnosis by Sowerby is rather meagre, though much better than several others by this author. The hinge is armed with a distinct spathulate lamina.

1861.]

## CUCURBITULA.

*C. cymbia*,\* Spengler, sp.

*Gastrochæna cybium*, Spengler, Nov. Act. Sc. Soc. ii. 1783.

*Fistulana lagenula*, Lamarck, Anim. Sans Vert. v. p. 436, 1818.

“ (Desh. ed.) Anim. sans Vert. vi. p. 31, 1835.

Bosc, Hist. des Coq. ii. p. 205, 1824.

Hanley, Desc. Cat. p. 3, t. 13, f. 59, 1842.

Catlow, Conch. Nomenc. p. 2, 1845.

*Cucurbitula lagenula*, Gould, Boston Proc. viii. p. 22, 1861.

*Description*.—“*C. nanâ*, laterè affixâ; vaginâ lagenciformi, segmentis transversis articulatâ.”—*Lamarck*.

“*T. elongatâ*, arcuatâ, tenuis, lacteâ, posticè quadrangularis, anticè declivis, et in rostrum protractâ; umbonibus ventricosis ad quadrantem anticalem positus; marginè dorsali posticâ rectâ; marginè ventrali incurvatâ; angulis posticis rotundatis; fasciè dorsali latè ovato-cuneatâ, posticè cito angustatâ; fasciè ventrali ovatâ, omnino hiante. Long. 12; lat. 6; alt. 3 millim.”—*Gould*.

*Hab*.—“Inhabits Hong Kong Harbor, 10 fathoms, Shelly Sand.” *W. Stimpson*. “Red Sea;” label of specimen, from G. B. Sowerby, in Coll. A. N. S.

The tube of this species is a well known object in Conchological Collections; it is strange that the valves were never described until this year. It is widely distributed as a fossil species, and, had we included its synonymy, as such, the list would extend to a page or more. Although the descriptions by the older writers are sufficiently comprehensive for a perfect recognition of the species by its tube alone, still it is very questionable, whether, considering that Dr. Gould was the first to describe the entire Mollusk, the credit should not be given to him for the species.

## BRYOPA.

1. *B. aperta*,\* Sowerby, sp.

*Clavagella aperta*, Sowerby, Genera, No. 13, f. 1, 2, 3, 4, 1820-24,

Crouch, Introd. Lamarck, t. 2, f. 7, *a, b*, 1827.

Deshayes, Encyc. Meth. Vers. ii. p. 240, 1830.

“ Lamarck, Anim. sans Vert. 2 edit. vi. p. 25, 1835.

Deshayes, Expl. Sci. de l'Algerie, Moll. p. 15, t. 1, f. 1.

Cuvier, Regne, Anim. (Audouin's Ed.) Moll. t. 117, f. 2.

Reeve, Conch. Syst. i. p. 35, t. 18, 1841.

Hanley, Desc. Cat. p. 2, t. 9, f. 21, 1842.

Cailliaud, Guerin's Mag. Zool. 1842, t. 49, f. 1-7, t. 50,

f. 1 and 2, t. 51, f. 1-4.

Cailliaud, Chenu's Ill. Conch. *Clavagella*, p. 4, t. 1, f. 3-6.

Catlow, Conch. Nomenc. p. 2, 1845.

H. and A. Adams, Genera, iii. t. xci. f. 3, *a, b, c*, 1856.

Gray, Figs, Moll. Anim. v. t. 340 f. 6, 7, 8, 1857.

*Clavagella vivens?* Rang, Man. Moll. p. 342, 1829.

*Clavagella sicula*, Dellachiaje Anim. Sans Vert. t. 83, f. 19 and 23, t. 84, f. 18, 22, 23.

*Bryopa aperta*, Gray, Zool. Proc. p. 314, 1858.

H. and A. Adams, Genera, ii. p. 649, 1858.

*Description*.—“*B. excavatio ovatâ*, rotundâ, superascensâ; tubo cum limbis; valvis subtriangularibus, ovatis, maximè oscilatis, concavis, rugosis, margaritaceis intus; umbone subrotundato.”—*Cailliaud*.

*Hab*.—Mediterranean Sea.

A very complete account of this species is given in Cailliaud's Monograph, contained in Guerin's Magazine. M. Cailliaud considers the following species (*B. lata*) a synonym: not being entirely satisfied that such is the case, I have not united them under one description. A full anatomical description, splendidly illustrated, is contained in Deshayes' Mollusca of the Exploration of Algeria.

2. *B. lata*, Broderip, sp.

*Clavagella lata*, Broderip, Zool. Proc. p. 111, 1834.

- “ “ Trans. 1, p. 265, t. 30, f. 8-10, 1835.  
 Owen, (Anatomy,) Trans. 1, p. 267, t. 3, f. 11-16, 1835.  
 Müller, Syn. Test. Viv. p. 240, 1836.  
 Hanley, Desc. Cat. p. 2, t. 11, f. 4, 1842.  
 Deshayes, Traite, Elem. p. 25, t. 1, f. 12-14, 1843-50.  
 Cailliaud, Chenu, Illus. Conch. p. 5, t. 3, f. 7.  
 Catlow, Conch. Nomenc. p. 2, 1845.  
 H. and A. Adams, Genera, ii. p. 338, 1856.

*Bryopa lata*,

- “ “ “ “ ii. p. 649, 1858.  
 Gray, Zool. Proc. p. 315, 1858.

*Description*.—“*B. camerâ rotundato-ovatâ, valvâ liberâ, latiusculâ, subtrigonâ, subconvexâ, externâ concentricè rugosâ, intus nitente; umbone subrotundato.*”—*Broderip*.

*Hab.*—Indian Ocean, Pacific.

3. *B. Melitensis*, Broderip, sp.

*Clavagella Melitensis*, Broderip, Zool. Proc. p. 116, 1834.

- “ “ Trans. i. p. 265, t. 35, f. 5-8, 1835.  
 Müller, Syn. Test. Viv. p. 240, 1836.  
 Cuvier, Regne Anim. (Audouin's edit.) t. 117,  
 f. 1, *a, b, c, d*.  
 Hanley, Desc. Cat. p. 2, t. 11, f. 3, 1842.  
 Cailliaud, Guerin's Mag. Zool. t. 50, f. 4, 1842.  
 “ Ill. Conch. Chenu, *Clavagella*, p. 4,  
 t. 1, f. 5, and t. 3, f. 1-6.  
 Forbes, Rep. Ægean Invert. p. 142, 1843.  
 Deshayes, Expl. Sci. de l'Algerie, Moll. p. 14,  
 t. 1, f. 2.  
 Catlow, Conch. Nomenc. p. 2, 1845.  
 H. and A. Adams, Genera, ii. p. 338, 1856.  
 Gray, Figs. Moll. Anim. v. t. 340, f. 9, and t. 341,  
 f. 1, 1857.

*Clavagella angulata*, Philippi, Enum. Moll. Sicil. ii. p. 2, t. 13, f. 3, 1844.

*Bryopa Melitensis*, H. and A. Adams, Genera, ii. p. 649, 1858.

*Description*.—“*Testâ subrotundatâ, convexâ, rugosâ, intus subnitens; tubo longitudinaliter corrugate.*”—*Broderip*.

*Hab.*—Greece, Venice, Malta, Sicily.

Dr. J. E. Gray, in Proc. Zool. Soc. 1858, writes this as a synonym to *B. aperta*. I have followed Deshayes and Cailliaud in considering it distinct. Deshayes has detected differences in the animals of the two species, and the shells may be readily separated by the differences in shape of the valves, which appear to be permanent.

Subgenus DACOSTA.

4. *B. Australis*,\* Sowerby, sp.

*Clavagella Australis*, Sowerby, Stuchbury Cat. App. t. 1, f. 1.

Hanley, Desc. Cat. p. 2, t. 9, f. 22, 1842.

H. and A. Adams, Genera, ii. p. 338, iii. t. xci. f. 3,  
*a, b, c*, 1856.

Bryopa (S. G. Dacosta,) Australis, H. and A. Adams, Genera, ii. p. 649, 1858.

Dacosta Australis, Gray, Zool. Proc. p. 315, 1858.

Clavagella elongata, Broderip, Zool. Proc. p. 116, 1834.

“ “ Trans. i. p. 265, t. 35, f. 1-4, 1835.

Müller, Syn. Test. Viv. p. 240, 1836.

Hanley, Desc. Cat. p. 2. t. 11, f. 1, 2, 1842.

Cailliaud, Guerin's Mag. Zool. p. 17, t. 50, f. 3, 1842.

“ Chenu, Illust. Conch. Clavagella, p. 4, t. 1, f. 4.

Catlow, Conch. Nomenc. p. 2, 1845.

H. and A. Adams, Genera, ii. p. 338, 1856.

“ “ “ “ p. 649, 1858.

Bryopa elongata

*Description.*—“*B. camerâ elongato-ovatâ*; *valva liberâ elongatâ, subtrigonâ, convexâ, externè concentricè valdè rugosâ, intus nitente*; *umbone acuto.*”—*Broderip.*

*Hab.*—Pacific.

I agree with Dr. Gray in uniting *B. elongata* with *B. Australis*, a comparison of the descriptions and figures of the two species demonstrates their entire identity.

5. *B. balanorum*, Scacchi, sp.

*Clavagella balanorum*, Scacchi, Mss. Philippi, Weigman's Archiv für naturg. i. p. 181, t. 3, f. 1-6, 1840.

Cailliaud, Guerin's Mag. Zool. p. 16, t. 52, f. 1-5, 1842.

Cailliaud, Chenu's Ill. Conch. Clavagella, p. 4, t. 1, f. 7.

Hanley, Desc. Cat. p. 2, t. 10, f. 21, 1842.

Philippi, Enum. Moll. Sicil. ii. p. 1, t. 13, f. 2, 1844.

Catlow, Conch. Nomenc. p. 2, 1845.

Gray's Figs, Moll Anim. v. t. 340, f. 1-5, 1857.

H. and A. Adams, Genera, ii. p. 338, 1856.

“ “ “ “ p. 649, 1858.

*Bryopa balanorum*,

*Description.*—“*B. testâ bivalvis in conceptaculo ovali, rotundatâ*; *conceptaculum ipsum in fistulam subtetragonam productum*; *valvæ subtrigonæ, rugosæ.*”—*Cailliaud.*

*Hab.*—Naples.

I have strong doubts respecting the distinctness of this species from *B. aperta*. The shell is uniformly smaller, and the tube short, just extending beyond the surface of the masses of *Balani* in which it is imbedded. Perhaps the young shell of *B. aperta*?

#### BRECHITES.

1. *B. annulus*,\* Deshayes, sp.

*Aspergillum annulosum*, Deshayes, Mss. in Mus. Cuming.

Reeve, Monog. Asp. t. 1, f. 1, a, b, 1860.

*Brechites annulus*, Gray, Zool. Proc. p. 312, 1858.

*Description.*—“*B. testâ valvis sublatè ovatis, tumidiusculis: vaginâ elongato-attenuatâ, undique undato-annulosâ*; *fimbriâ peramplâ, regulari, tubulis longis, minimis, confertis*; *disco valdè convexo, perforationibus parvis, numerosis, parum tubulosis.*”—*Reeve.*

*Hab.*—Singapore.

This species may be distinguished from *B. Javanus* and *B. pulchrus* by the annular markings on its tube. The frill is much more regular than in either of the other species.

2. *B. Javanus*, Lamarek, sp.

- Aspergillum Javanum*, Lamarek, *Anim. Sans Vert.* v. p. 439, 1818.  
 “ (Desh. edit.) *Anim. sans Vert.* vi. p. 20,  
 1835.  
 Blainville, *Malacol.* p. 576, t. 81, f. 2, 1825.  
 Crouch, *Introd. Lam.* t. 2, f. 5, 6, 1827.  
 Cuvier, *Regne Anim.* (Audouin's ed.) t. 119, f. 2.  
 Wyatt, *Conch.* t. 33, f. 3, 1838.  
 Anton, *Verzeich der Conch.* p. 1, 1839.  
 Reichenbach, *Conchylien*, p. 122, 1842.  
 Hanley, *Desc. Cat.* p. 1, 1842.  
 Reeve, *Conch. Syst.* t. 17, f. 3-5, 1843.  
 “ *Monog. Asp.* t. 1, f. 3, 1860.  
 Deshayes, *Traite, Elem.* i. pt. 2, p. 15, f. 1, 2, 3.  
 Potiez et Mich. *Gallerie des Moll.* ii. p. 273, 1844.  
 Catlow, *Conch. Nomenc.* p. 1, 1845.  
 Chenu, *Ill. Conch. Asp.* p. 2, t. 2, f. 1, 2.

*Aspergillum Listeri*, Gray, *Ann. Philos.* 1825.

“ *Zool. Proc.* p. 311, 1858.

- Clepsydra Javanica*, Schumacher, *Essai d'un, Nov. Syst.* p. 261, 1817.  
*Penicillus Javanus*, Bosc, *Hist. Nat. des Moll.* v. p. 154, t. 41, f. 1, 1824.  
*Brechites Javanus*, H. and A. Adams, *Genera*, ii. p. 339, t. xci. f. 4a, 1856.  
*Brechites penis*, Mörch, *Catalogue*, 1853.  
*Phalus testaceus*, Lister, t. 548, f. 3, 1685.

*Phalus marinus*, Rumphius, *Amboinsche*, t. 41, f. 7, 1705.

Gualtieri, *Test.* t. 10, f. m. 1742.

*Tubulus marinus*, (partim) Klein, *Tab. Mar. Gen.* p. 20, 1753.

Martini, *Conch. i.* p. 42, t. 1, f. 7, 1769.

*Serpula Peuis*, (partim) Linnaeus, *Gmelin*.

Brooke, *Conch.* t. 9, f. 130, 1815.

Knorr, *Vergnüg.* iv. t. 28, f. 1, vi. t. 40, f. 1, 1773.

Schreibers, ii. p. 372, 1793.

Schroeter, *Einleit. Conch. ii.* p. 554, 1784.

*Serpula aquaria* (partim,) Dillwyn, *Cat.* p. 1083, 1817.

Mawe, *Conch.* t. 34, f. 3, 1823.

Wood, *Index, Test.* edit. 2, t. 38, f. 34, 1828.

Woodarch, *Introd.* t. 4, f. 61, 1831.

*Serpula perforata*, Shaw, *Nat. Misc.* vi. t. 188.

*Aquaria radiata*, Perry, *Conch.* 1811.

*Description*.—“*B. testâ valvis sublatè ovatis, tumidiuseculis; vaginâ elongato-attenuatâ, subannulosâ; fimbriâ amplâ, irregulari, subflexuosâ, tubulis parvis, longis, confertis, hic illic ramoso-agglomeratis; disco valdè convexo, perforationibus numerosis, parvis, parum tubulosis.*”—*Reeve*.

*Hab.*—Java.

*Aspergillum sparsum* of Sowerby is sometimes quoted as a synonym of *B. Javanus*—it is, however, more closely allied to *Brechites aquaria* of Burrow, in the synonymy of which we have placed it.

Dr. Gray has named this species *B. (Aspergillum) Listeri*, alleging that the *Aspergillum Javanum* of Lamarek included several species; but since the majority of conchologists have designated this shell as Lamarek's species; it does not seem necessary to adopt Dr. Gray's name at this late period.

3. *B. pulchrus*, Deshayes, sp.

*Aspergillum pulchrum*, Deshayes, *Mss. in Mus. Cuming*.

Reeve, *Monog. Asp.* t. 3, f. 13, 1860.

Gray, *Zool. Proc.* p. 312, 1858.

*Aspergillum Javanum*, var. *Chenu*.

*Description*.—"B. testâ valvis ovatis, anticè subattenuatis; vaginâ angustâ, obscurè annulosâ; fimbriâ perampla, profusè ramosâ, tubulis prælongis minutis, crispatis, numerosissimis, irregulariter dichotomis, disco minutè perforato, perforationibus spinoso-tubulosis."—*Reeve*.

*Hab.*—Singapore.

*B. pulchrus* is remarkable for the profusion of twisted tubuli constituting its fringe. It is a smaller shell than *B. Javanus*, and is apparently a good species.

Subgenus WARNEA.

4. *B. Australis*, *Chenu*, sp.

*Aspergillum Australe*, *Chenu*, *Illust. Conch.* p. 3, t. 3, f. 1, 1a.

*Catlow, Nomenc.* p. 1, 1845.

*Brechites Australis*, *H. and A. Adams, Genera*, ii. p. 339, 1856.

*Warnea Australis*, *Gray, Zool. Proc.* p. 310, 1858.

*Aspergillum Cumingianum*, *Chenu, Illust. Conch.* p. 3, t. 3, f. 4, 4a.

*Catlow, Conch. Nomenc.* p. 1, 1845.

*Reeve, Monog. Asp. Conch. Icon.* t. 2, f. 7, a, b, 1860.

*Brechites Cumingianus*, *H. and A. Adams, Genera*, ii. p. 339, 1856.

*Aspergillum incertum*, *Chenu, Illust. Conch.* p. 4, t. 4, f. 5.

*Catlow, Conch. Nomenc.* p. 1, 1845.

*Reeve, Monog. Asp.* t. 4, f. 19, 1860.

*Brechites incertus*, *H. and A. Adams, Genera*, ii. p. 339, 1856.

*Description*.—"B. vaginâ longâ, rectâ, subclavatâ, arenas et zoophyta agglutinante; disco plano, irregulariter fimbriato, tubulis extus minimis et subprominulis perforate; fissurâ profundè incisâ, limbis foleaceis infernè decoratâ; valvis æqualibus, inclusis."—*Chenu*.

*Hab.*—Australia.

The three species quoted above may not be the same, but more specimens will require to be examined to prove their distinctness.

5. *B. vaginiferus*,\* *Lamarck*, sp.

*Aspergillum vaginiferum*, *Lamarck, Anim. sans Vert.* v. p. 430, 1818.

" (*Desh. ed.*) *Anim. sans Vert.* vi. p. 21, 1835.

*Sowerby, Genera*, f. 1, 2.

*Hanley, Desc. Cat.* p. 1, t. 9, f. 23, 1842.

*Ruppell, Atlas. Reise, Nord. Afric.* t. 12, f. 2.

*Savigny, Expl. Egypt, Moll.* t. 14, f. 9.

*Guerin, Iconog. du Reg. Anim.* t. 33, f. 7.

*Reeve, Conch. Syst.* t. 17, f. 1, 2, 1843.

*Chenu, Conch. Illust. Asp.* p. 2, t. 1, f. 1, a, b, c, t. 4, f. 9, a, b, c, and t. 5, f. 1-9.

*Gray, Figs. Moll. Anim.* t. 341, f. 2, 1857.

*Reeve, Monog. Asp. Conch. Icon.* t. 1, f. 2, 1860.

*Brechites vaginiferus*, *H. and A. Adams, Genera*, ii. p. 339, iii. t. xci. f. 4, 1856.

" (*S. G. Warnea*,) *vaginiferus*, *H. and A. Adams, Genera*, ii. p. 649, 1858.

*Warnea vaginifera*, *Gray, Zool. Proc.* p. 339, 1858.

*Aspergillum Delessertianum*, *Chenu, Conch. Illust. Asp.* p. 3, t. 1, f. 2.

*Catlow, Nomenc.* p. 1, 1845.

*Reeve, Monog. Asp.* t. 2, f. 6, 1860.

*Brechites Delessertianus*, *H. and A. Adams*, ii. p. 339, 1856.

*Description*.—"B. testâ valvis oblongo-ovatis, concentricè tenuissimè lirato-

striatis, posticè angulatis; vaginâ longissimè subrectâ, arenulas agglutinante, limbo ad superam extremitatè conspicuè trifariam ad quinquefariam foliato; fimbriâ brevi, tubulis subamplis, liberis, sæpè irregularibus; disco convexo, amplo, perforationibus amplis, tumidiusculis."—*Reeve*.

*Hab.*—Red Sea.

There is but little doubt of the identity of *B. Delessertianus* with this species. Gray and Reeve both consider it the same. The differences in *B. Delessertianus* are not sufficient for a separation, unless the examination of a large number of specimens shall prove them to be constant.

PENICILLUS.

1. *P. aquaria*,\* Burrow, sp.

*Serpula aquaria*, Burrow, Elem. p. 166, t. 22, f. 3.

*Brechites aquarius*, H. and A. Adams, Genera, ii. p. 339, 1856.

*Penicillus aquarius*, H. and A. Adams, Genera, ii. p. 649, 1858.

Gray, Zool. Proc. p. 312, 1858.

*Aspergillum sparsum*, Sowberby, Genera, No. 27, f. 3-5.

*Penicillus sparsus*, H. and A. Adams, Genera, ii. p. 649, 1858.

*Aspergillum semifimbriatum*, Chenu, Ill. Conch. Asp. p. 4, t. 3, f. 5.

Catlow, Conch. Nomencl. p. 1, 1845.

Reeve, Monog. Asp. t. 2, f. 5, 1860.

*Serpula penis?* (pars) Linnæus, Gmelin, etc.

*Description.*—"P. testâ valvis sublâtè ovatis, posticè subangulatis, vaginâ tumidiusculâ, sæpè distortâ, infernè contractâ; fimbriâ subrectâ, tubulis sub-elongatis, dichotomis; disco parviusculo, perforationibus simplicibus."—*Reeve. Desc. of Semifimbriatum.*

*Hab.*—Red Sea.

Burrow's description of *P. aquaria* is entirely unsatisfactory, and he is only given credit for this species, on account of his figure, which represents it well enough.

Mr. Reeve considers *P. semifimbriata* doubtfully distinct. Dr. Gray regards it, however, as a merely distorted form of this species. The latter is undoubtedly correct, as a comparison of the figures of the two species abundantly establishes. Dr. Chenu's description is drawn up from a single specimen in the cabinet of Hugh Cuming.

2. *P. dichotoma*,\* Chenu, sp.

*Aspergillum dichotomum*, Chenu, Ill. Conch. Asp. p. 3, t. 2, f. 6.

Catlow, Conch. Nomencl. p. 1, 1845.

Reeve, Monog. *Aspergillum*, t. 3, f. 9, 1860.

*Brechites dichotomus*, H. and A. Adams, ii. p. 339, 1856.

*Aspergillum disjunctum*, Deshayes, Mss. in Mus. Cuming.

Reeve, Monog. Asp. t. 3, f. 12, 1860.

*Description.*—"P. testâ valvis oblongo-ovatis, subtrapezoideis; vaginâ breviusculâ, supernè gradatim attenuatâ, sæpè distortâ, infernè subcontractâ; fimbriâ subamplâ, valdè irregulari, tubulis tenuibus elongatis promiscuè distortis et agglomeratis, sæpè dichotomis; disco parviusculo, convexo, minutè perforato."—*Reeve*.

*Hab.*—Singapore.

Dr. Gray considers this species to be a variety of *P. aquaria*, from which it constantly differs, however, in having a much more irregular frill, with the tubuli more numerous.

I have ventured, after a comparison of figures and descriptions in Reeve's Monograph, to include *P. disjuncta*, in the synonymy of this species.

3. *P. radix*,\* Deshayes, sp.

*Aspergillum radix*, Deshayes, Mss. in Mus. Cuming.

Reeve, Monog. *Aspergillum*, t. 3, f. 11, 1860.

*Penicillus radix*; Gray, Zool. Proc. p. 312, 1858.

*Description*.—"P. testâ valvis ovatis, utrinque subangulatis; vaginâ supernè compressâ et longitudinaliter sulcatâ; infernè globoso-tumidâ, de inde angustè contractâ; fimbriâ amplâ, tubulis elongatis, confertis, parum irregularibus; disco parvo, profusè minutè perforato."—*Reeve*.

*Hab.*—Amboina.

Mr. Reeve does not consider this species as positively distinct, but states that Mr. Cuming possesses three specimens, all alike. Judging from the figure and description, I do not doubt its specific weight.

#### Subgenus CLEPSYDRA.

#### 4. *P. strangulata*, Chenu, sp.

*Aspergillum strangulatum*, Chenu, *Illust. Conch.*, p. 3, t. 2, f. 4.

Catlow, *Conch. Nomenc.* p. 1, 1845.

*Brechites strangulatus*, H. and A. Adams, *Genera*, ii. p. 339, 1856.

*Penicillus* (S. G. *Clepsydra*) *strangulatus*, H. and A. Adams, ii. p. 649, 1858.

*Clepsydra strangulata*, Gray, Zool. Proc. p. 313, 1858.

*Description*.—"P. vaginâ longâ, clavatâ, variè pictâ, supernè strangulatâ; disco plano, tubulis minimis tecto; fimbriâ regulariter triplicatâ; fissurâ rectâ; valvis inæqualibus, incluso-depressis."—*Chenu*.

*Hab.*—N. E. Coast of Australia.

#### FŒGIA.

#### 1. *F. agglutinans*, Lamarck, sp.

*Aspergillum agglutinans*, Lamarck, *Anim. Sans Vert.* v. p. 430, 1818.

" (Desh. edit.) *Anim. Sans Vert.* vi.

p. 21, 1835.

Deshayes, *Encyc. Meth. Vers.* ii. p. 73, 1830.

Cuvier, *Regne Anim.* (Audouin's ed.) t. 119, f. 1.

Hanley, *Desc. Cat.* p. 2, t. 10, f. 19, 1842.

Catlow, *Conch. Nomenc.* p. 1, 1845.

Chenu, *Illust. Conch. Asp.* p. 2, t. 3, f. 2.

Reeve, *Monog. Asp.* t. 4, f. 18, 1860.

*Brechites agglutinans*, H. and A. Adams, *Genera*, ii. p. 339, 1856.

*Fœgia agglutinans*, " " " " ii. p. 650, 1858.

Gray, *Proc. Zool. Soc.* p. 313, 1858.

*Aspergillum Nova Zelandiæ*, Lamarck, *Anim. sans Vert.* v. p. 430, 1818.

" (Desh. ed.) *Anim. sans Vert.* vi.

p. 21, 1835.

Hanley, *Desc. Cat.* p. 2, t. 9, f. 54, 1842.

Chenu, *Ill. Conch. Asp.* p. 2, t. 2, f. 6, 7, 8, 9.

Catlow, *Conch. Nomenc.* p. 1, 1845.

Reeve, *Monog. Asp.* t. 4, f. 17, 1860.

*Penicillus Nova Zelandiæ*, Bosc. *Hist. Nat. des Moll.* i. p. 154, 1824.

*Brechites* (S. G. *Fœgia*), *Nova Zelandiæ*, H. and A. Adams, *Genera*, ii.

p. 339, 1856.

*Aspergillum Nova Hollandiæ*, Chenu, *Ill. Conch. Asp.* p. 4, t. 4, f. 8.

Catlow, *Conch. Nomenc.* p. 1, 1845.

*Brechites* (S. G. *Fœgia*), *Nova Hollandiæ*, H. and A. Adams, ii. p. 339, 1856.

*Description*.—"F. testâ valvis (obtectis); vaginâ clavatâ, arenulas, calculos, et conchas densè agglutinante; fimbriâ vix nullâ, tubulis brevissimis, subamplis, irregularibus; disco convexo, sparsim perforato, perforationibus subamplis, subpapillaribus."—*Reeve*.

*Hab.*—New Holland.



2. *F. Zebuense*, Chenu, sp.

*Aspergillum Zebuense*, Chenu, Ill. Conch. Asp. p. 3, t. 3, f. 3.  
 Catlow, Conch. Nomenc. p. 1, 1845.  
 Reeve, Monog. Asp. t. 3, f. 8, 1860.

*Brechites Zebuensis*, H. and A. Adams, ii. p. 339, 1856.

*Aspergillum Philippinense*, Chenu, Ill. Conch. Asp. p. 3, t. 4, f. 7.  
 Catlow, Conch. Nomenc. p. 1, 1845.  
 Reeve, Monog. Asp. t. 3, f. 10, 1860.

*Brechites Philippinensis*, H. and A. Adams, Genera, ii. p. 339, 1856.

*Description*.—"E. testâ valvis oblongo-ovatis, posticæ subexpansis; vaginâ arenulas agglutinante, supernè subattenuatâ, utrinque longitudinaliter sulcatâ, infermè abruptè contractâ; fimbriâ sub-irregulari, tubulis distinctis liberis; disco parvo, perforationibus perpaucis, tubulosis."—*Reeve*.

*Hab.*—Zebu, Philippines. Mus. Cuming.

This, and the preceding, may prove to be one species; it is distinguished from *F. agglutinans*, principally by the much larger number of tubes on its disk, and by the larger size of its tube.

## Subgenus ARYTENE.

3. *F. Recluziana*, Chenu, sp.

*Aspergillum Recluzianum*, Chenu, Ill. Conch. Asp. p. 4, t. 4, f. 1, 1a.  
 Catlow, Conch. Nomenc. p. 1, 1845.

*Brechites Recluzianus*, H. and A. Adams, Genera, ii. p. 339, 1856.

*Aspergillum incrassatum*, Chenu, Ill. Conch. Asp. p. 4, t. 4, f. 2.  
 Catlow, Conch. Nomenc. p. 1, 1845.  
 Reeve, Monog. Asp. t. 4, f. 15, 1860.

*Brechites incrassatus*, H. and A. Adams, Genera, ii. p. 339, 1856.

*Description*.—"F. testâ valvis oblongo-ovatis, vaginæ prolotione bifurcatâ partim indutis; vaginâ mediocri, subcontortâ, calculos parvos sparsim agglutinante; fimbriâ plus minus irregulariter distorta, tubulis hic illic dichotomis; disco parvo, perforationibus paucis, valdè irregularibus."—*Reeve*.

*Hab.*—?

Dr. Gray considers *F. Recluziana* a variety of the following species, *F. tuberculata*; the tubuli in the latter are, however, very regular, and but little spread out, showing a marked contrast to the rather irregular fringe of this species.

Mr. Reeve quotes *F. Recluziana* as a synonym of *F. incrassata*, in which he is incorrect, for the former having a prior place and figure in Chenu's Monograph, must, of course, be retained as the name of the species.

4. *F. tuberculata*, Chenu, sp.

*Aspergillum tuberculatum*, Chenu, Ill. Conch. Asp. p. 3, t. 2, f. 3.  
 Catlow, Conch. Nomenc. p. 1, 1845.  
 Reeve, Monog. Asp. t. 3, f. 16, 1860.

*Brechites tuberculatus*, H. and A. Adams, Genera, ii. p. 339, 1856.

*Fœgia* (S. G. Arytene,) *tuberculatum*, H. and A. Adams, Genera, ii. p. 650, 1858.

*Arytene tuberculata*, Gray, Zool. Proc. p. 313, 1858.

*Aspergillum ornatum*, Chenu, Ill. Conch. Asp. t. 4, f. 3.  
 Catlow, Conch. Nomenc. p. 1, 1845.

*Brechites ornatus*, H. and A. Adams, Genera, ii. p. 339, 1856.

*Aspergillum clavatum*, Chenu, Ill. Conch. Asp. p. 4, t. 4, f. 4.  
 Catlow, Conch. Nomenc. p. 1, 1845.  
 Reeve, Monog. Asp. t. 4, f. 14, 1860.

*Brechites clavatus*, H. and A. Adams, Genera, ii. p. 339, 1856.

*Description*.—"F. testâ valvis ovatis, vaginæ prolotione bifurcatâ partim indutis; vaginâ attenuatâ, subcurvatâ arenulas calculosque parvos aggluti-  
 1861.]

nante; fimbriâ regulariter declivi, contractâ, tubulis subelongatis, confertis, hic illic dichotomis; disco parvo, perforationibus paucis, valdè irregularibus."—*Reeve*.

*Hab.*—Moluccas.

#### HUMPHREYIA.

1. *H. Strangei*, A. Adams, sp.

*Aspergillum Strangei*, A. Adams, *Zool. Proc.* p. 91, 1852.

*Reeve*, *Monog. Asp. t. 2*, f. 4, 1860.

*Brechites Strangei*, H. and A. Adams, *Genera*, ii. p. 339, 1856.

*Humphreyia Strangei*, H. and A. Adams, *Genera*, ii. p. 650, 1858.

*Gray*, *Zool. Proc.* p. 317, 1858.

*Description.*—"H. testâ adhærente, fuscescente-carneo tinctâ, valvis subquadrato-ovatis, posticè latioribus, subangulari-expansis; vaginâ brevi, distortâ, quadrato-rotundatâ, ad angulas quatuor obtusè carinatâ; fimbriâ discoque lateraliter compressissimè distortis, perforationibus perpaucis, irregulariter sparsis, parum tubulosis."—*Reeve*.

*Hab.*—Sydney Bay, Australia.

#### On the Genera *Panolopus*, *Centropyx*, *Aristelliger* and *Sphærodactylus*.

BY E. D. COPE.

PANOLOPUS Cope.

Form elongate; body fusiform, tetragonal. Anterior extremities without digits; posterior with a rudimentary one on the inner border. Scales minutely parallel-keeled. Inferior palpebra squamous. Inter-parietal and fronto-parietal distinct; fronto- and internasal confluent, forming a nine-sided shield. Supranasals, nasals, first upper labial and rostral plates confluent. Nostril longitudinal, in contact with an incomplete labial suture. Dentition pleurodont; teeth obtuse. Auricular opening present.

This genus, though presenting the structure of rostral plate attributed by Dr. Gray to his family *Sepsidæ*, appears to be an extreme form of the series of genera of *Scincidæ* (the *Diploglossinæ*), which we commence with *Microlepis*, *Diploglossus*, etc., and in which the first non-development of extremal parts is seen in *Sauresia*. *Evesia* exhibits a somewhat similar though more degraded condition, and perhaps bears a like relation to certain genera of smooth-scaled *Scincidæ* *Saurorhthalmia*. Besides the present, America possesses six genera which exhibit a deprivation of one or both pairs of extremities or of digits above the number of three on each foot. They are distributed between the families of *Scincidæ*, *Chalcididæ* and *Zonuridæ*. The same families, with another,—the *Chamæosauridæ*,—are represented in the Old World by no less than thirty-one genera of similar kind. Twelve of these are confined to Africa, ten to Australia. The fact that this arrangement of diminishing series is exhibited by so many categories or families of the *Lacertilia*, and not only by families, but by *subfamilies* within themselves,—instead of as a great ordinal gradation toward the *Ophidia*,—is worthy of our closest attention.

The close analogies presented by the recent acrodont and pleurodont *Strobilosaura*, and their widely divergent affinities with the orders of the past, are also scarcely less suggestive.

*P. costatus*, Cope.

Posterior border of rostral plate chevron-shaped. Internasal bounded laterally by anterior supraorbital and prefrontal. Five scales in the supraorbital series, bounded beneath by a smaller series of five, of which the anterior is elongate, and rests on the median frenal. Postfrenal small. Suboculars two,

[Dec.

posterior elongate, its angle directed between the third and fourth (distinct) upper labials. Of these there are seven, excluding two anterior, whose sutures are more or less obliterated. Lateral borders of frontal parallel; the posterior doubly sigmoid, medially in contact with the cuneiform interparietal, exteriorly with the small frontoparietals. Parietals small, longer than broad; a transverse postparietal. Six inferior labials; a large transverse symphyseal; seven inferior and five infralabials on each side. Tympanic orifice small, not lobate. Three rows of hexagonal preanal plates, the marginal longer than broad. Scales small, in forty-four longitudinal rows, those of the sides arranged vertically and horizontally. Anterior extremity consisting of brachium and anti-brachium, as long as the commissure of the mouth. It is terminated on its inner face by a tubercle. Posterior extremity as long as the distance from the rictus to the axilla, consisting of femur, tibia and tarsus. Sole tuberculous, with two callosities, that on its external border much the larger; a tubercle-like spur on its inner. Tail very elongate. Length of head and body to vent 3 inches 8 lines; muzzle to auricular orifice 8 lines; anterior extremity 6 lines; posterior 9 lines; tail?

Color above light brown, with numerous small dark brown spots on the dorsal region. Sides dark brown, darker anteriorly, where a bandlike arrangement is assumed as far as the orbit. From the auricular opening posteriorly, this is crossed by numerous blackish brown, vertical bars, with irregular light posterior borders. Mentum whitish; abdomen yellowish.

Specimen No. 1502, Mus. Compar. Zool., Cambridge, Mass., brought from near Jeremie, St. Domingo, by Dr. D. F. Weinland.

#### CENTROPYX, Spix.

Two species of this genus are described by Duméril and Bibron, while Gray and Wiegmann enumerate three. A fourth is here added. Anal spurs exist in *C. calcaratus*, *C. decodon* and *C. striatus* (Wiegmann). I have not seen the male *C. intermedius*.

#### *C. calcaratus*, Spix.

Intermaxillary teeth twelve, the six median smaller. Posterior cephalic plates extending over the whole breadth of the head. Dorsal scales small, keeled, in about forty longitudinal series. Scales of the gular fold not extending beyond its border. Abdominal scales in fourteen longitudinal rows. Preanal scales smooth. Femoral pores twenty.

Above olive green, with a light median dorsal line and two lateral, one extending from each temple to the corresponding groin. Interval between these bands marked with a series of black spots. Tail and extremities spotted; posterior femoral surface marked with a black line, bordered with white. Beneath white, shaded with bluish green.

*Habitat.* Brazil, Guiana.

#### *C. decodon*, Cope.

Intermaxillary teeth ten, one on each side of the median pair, smaller. Posterior cephalic plates narrower than the width of the head. Dorsal scales large, in fourteen longitudinal series, becoming smaller upon the nape. Scales of the gular fold acute, produced, forming a serrate border. Abdominal scales in fourteen longitudinal rows; preanals smooth. Femoral pores seven or eight.

Above olive green, with short, irregular, subtransverse, black, pale-bordered spots on the median and posterior regions, and the base of the tail. A pale band extends from the temple to the cranial region; bordered above anteriorly with a black band; beneath, from the axillary region posteriorly, with spots of the same color. A second pale line extends from the tympanic

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orifice to the groin, beneath which are numerous white spots. Posterior extremities speckled with black; a pale line on the posterior face.

*Habitat.* Surinam. Mus. Academy Nat. Sciences; Dr. C. Hering, donor.

#### *C. intermedius*, Schlegel.

Intermaxillary teeth nine, a single external upon each side sometimes smaller. Posterior cephalic plates narrower than the breadth of the head. Dorsal scales small, in twenty-five to thirty-eight rows. Scales of the gular fold acute, produced, forming a serrate border. Abdominal scales in fourteen longitudinal rows; the preanal strongly keeled. Femoral pores fifteen.

Above brownish olivaceous, beneath paler. A light band extends from beneath the eye to the crural region: this is broadly bordered superiorly with brown, which becomes posteriorly broken into transverse bars. These are finally almost in contact dorsally, and are continued upon the median line of the tail. Upon the nape are indications of three median light streaks. From the axillary region extends a broad brown band, which is finally broken up. Upon the base of the tail and for a short distance anterior to the groin, a second pale line may be observed. Sides, belly and inferior surface of the extremities immaculate. Size similar to that of the preceding species, the length from muzzle to vent being 3 inches 6 lines.

*Habitat.* Barbadoes. Mus. Acad. Nat. Sciences.

I cannot arrive at any greater certainty than did Wiegmann as to whether the present species—his *C. vittatus*—is identical with that called by Gray (from Schlegel) *C. intermedius*. He says, (*Herpet. Mexic.*, 26,) “. . . didici, eandem speciem (si quid ex brevissimis Angli diagnosibus percipere licet) a cel. Schlegel *C. intermediam* appellari, quo nomine nullum potest excogitare melius.” I have followed Wiegmann in regarding them as identical.

#### *C. striatus*, Gray.

Intermaxillary teeth nine, the median five smaller than the external two upon each side. Posterior cephalic plates narrower than the temporal diameter of the head. Dorsal scales large, in “from seventeen to twenty-five rows.” (?) Scales of the gular fold acuminate, forming a serrate margin. Abdominal scales “in twelve rows,” (Gray.) Præanal scales? Femoral pores as in *C. calcarratus*?

Green olivaceous above, with two yellowish lines upon each side, which embrace a brown or black band: the superior sometimes bordered with black; the sides sometimes spotted. Beneath unicolor.

*Habitat.* Guiana.

#### ARISTELLIGER, Cope.

Digits slender at the base, free, dilated at the extremity and furnished with a single row of transverse plates beneath. Ultimate joint of all free, elongate, compressed, furnished with a claw, that of the thumb ensheathed. Tail elongate, cylindrical, the squamation minute, verticillate. Femoral and præanal pores none. Pupil elliptic; superior eyelid furnished with a hornlike process. Sides simple.

This genus is related to *Theconyx*, Gray and *Pentadactylus*, Gray, but both of these possess præanal or femoral pores; also in the former the last digital joint is scarcely free. The form is in fact hemidactyl, as Dr. Hallowell has indicated. The hornlike process above the eye, appears to be peculiar to it and to certain species of *Sphærodactylus*.

#### *A. præsignis*.

*Hemidactylus præsignis*, Hallow., *Proc. A. N. Sci. Phila.*, 1856, p. 222.

Dr. Hallowell's statement that the thumbs of this species are destitute of claws is erroneous; they are sheathed beneath a dorsal hood. The specimens from which the description was taken were either in a peculiar stage of metachrosis, or had been stained by impure spirits. The following is a true ac-

count of the color:—Above light yellowish brown, with a series of five sub-quadrate ochraceous dorsal spots. Top of the head and two bands converging posteriorly from the superior borders of the orbits, with variations upon the side of the body and neck, of the same ochraceous tint. In the female the dorsal spots are connected by dark ashy reticulations; the dark shade is also prevalent above each axilla, and as a band extending posterior to the orbit. Beneath pale, unicolor.

This species is not mentioned by Mr. Gosse in his interesting volume on Jamaica; it cannot, however, be uncommon in the island. The locality, Nicaragua, assigned by Dr. Hallowell at p. 480 of these Proceedings for 1860, is scarcely likely to prove a correct one.

A. lar, Cope.

Size rather large, head broad, massive. Tail to vent equal to one and one-half times the length of the head and body to vent. Anterior mandibular teeth longer than the median. Superior labials eight, the last beneath the orbit, succeeded by but one supplementary. Inferior eight, the posterior small. Symphyseal plate large, slightly truncate, bordered beneath the labials on each side by a large diagonal shield, which is the first of a diminishing series of four. Gular and dorsal regions granulated, the latter very coarsely; inferior faces of the extremities and thoracic and abdominal regions scaled in about thirty-two longitudinal series upon the latter. About twenty-one lamellæ beneath the penultimate posterior digit. Auricular opening large, the distance from its posterior border to that of the orbit equal to the breadth between the orbits.

Color above grey, with numerous brown spots, especially upon the scapular and ischiadic regions. Crown and front dark; labial region varied. An indistinct brown band extends posteriorly from the orbit, bordered below by a pale one, not more visible.

Length from muzzle to vent 5 inches; from vent to end of tail 7 inches 9 lines.

Discovered near Jeremie, Hayti, by Dr. Weinland. Lent to the author by Prof. Louis Agassiz, Mus. Compar. Zoology, Cambridge, Mass. (No. 1504.)

This species attains a size equal to that of any *Thecadactylus rapicaudus* which I have seen. It considerably exceeds the *T. praesignis*. The proportions of the teeth, the number of subdigital lamellæ, as well as the coloration, serve also to distinguish it from the latter.

#### SPLERODACTYLUS, Cuvier.

Eleven species of this genus are known to me through examination of specimens, and one (*S. fantasticus*) from the description of Duméril and Bibron. An additional species (*S. nigropunctatus*) has been described by Dr. Gray, and a fourteenth (*S. lineolatus*) is said to have been published. The last two are South American: the description of the first is too imperfect to permit its identification: that of the last is quoted from Lichtenstein and Von Marten's *Nomenclator Reptilium Mus. Zool. Berlin.*,—a work which Dr. Günther calls "printed, but not published."

Cuvier (*Regne Animal*) states that these animals possess retractile claws: the same statement is made by Dr. Gray in his *Synopsis of Reptiles*, in Griffith's edition of the same work. Mr. Gosse informs us that the *S. richardsonii* protrudes at will a sheathed claw from the inner side of the digital pallet, (*Nat. Soj. in Jamaica*, p. 255.) Duméril and Bibron assert (vol. iii., p. 401, 1836) that claws are wanting, which is confirmed by a similar statement made by Dr. Gray in the *Catalogue of Lizards in the British Museum*. MM. Cocteau and Bibron, in *De la Sagra's Cuba*, express the following opinion:—"On a dit qu'ils étaient complètement privés d'ongles; cependant un examen attentif de l'extrémité des doigts, fait voir que la dernière phalange est revêtue d'un écaille sur laquelle se retrouve en relief la forme d'un ongle crochu dont

les lames, ordinairement repliées sur elles mêmes, se seraient, pour ainsi dire, écartés l'une de l'autre, et étalées ici en une sorte de palette. C'est du moins, la disposition que nous avons observée sur nos deux especes de Cuba." From my own observations I arrive at the conclusion, that all the species possess claws, which are directed obliquely inward between superior and inferior expansions of the digital epidermis: and that the ordinary corneous sheath (*i. e.*, "les lames ordinairement repliées sur elles mêmes") exists, and cannot be said to be represented by the laminae of the pallet.

Authors generally state, that the iris does not contract the orifice of the pupil, and this is reasonably to be inferred from an examination of specimens in alcohol. Mr. Gosse, however, relates that the pupil of *S. richardsoni* became constricted when exposed to the sunlight; the only specimen of *S. alopex* which I have seen (in alcohol) exhibits this form of pupil in a moderate degree.

Dr. Günther has observed a spine upon the superior border of the eyelid in *S. macrolepis*. I have not been able to find other notice of this peculiarity. It appears to be almost a generic character, being doubtfully wanting\* in *S. richardsoni* only.

The following synopsis will, perhaps, improve the state of knowledge regarding the forms of this genus:

#### I. Dorsal scales rounded, smooth, small.

##### *S. sputator*, Cuv.

Labial plates  $\frac{5}{5}$ . Light brown, (greenish upon the dorsal region in life, according to MacLeay,) with ten broad, transverse, brown bands, paler medially, of which three are upon the body. Two light lines upon the front, which converge and unite upon the muzzle. Beneath gray. Tail shorter than the body.

*Hab.* Cuba. Mus. Washington, Philadelphia.

##### *S. cinereus*, MacLeay.

? *S. punctatissimus*, Dum. et Bibr.

Labial plates  $\frac{5}{4}$ . Tail longer than the body. Light gray rufous above, unicolor or punctulated with white, often most abundantly upon the head. A little paler beneath. I cannot distinguish specifically Cuban and Haytian individuals.

Mus. Philadelphia, Washington, Cambridge.

#### II. Dorsal scales flat, keeled.

\*Lateral dorsal scales similar to the median.

*a.* Dorsal scales smaller than the ventral.

*b.* Inferior labials (anterior to posterior border of orbit) five; muzzle less acute.

##### *S. argus*, Gosse.

Above purplish brown, sparsely dotted with white ocelli, which have dark borders. They are sometimes arranged in transverse series, sometimes longitudinally confluent on the head, forming bands, sometimes almost entirely wanting on the body or tail. Dorsal scales of medium size, nearly similar to those of *S. oxyrhinus*; irregular series of them lighter than others, forming an indistinct pattern of angulated lines.

*Hab.* Jamaica. Mus. Washington, Philadelphia.

\* Its absence in the plate 24, fig. 30, Rept. U. S. and Mex. Bound. Surv. of *S. notatus*, is an omission of the artist.

*S. millepunctatus*, Hallowell.

Dorsal scales very minute;\* occipital granular; frontal keeled. Muzzle rather short. Auricular orifice smaller than digital expansion. Light brown, spotted with darker brown; a post axillary, a loreal, two postocular and a median occipital brown line. A transverse crural spot, brown bordered posteriorly with white.

*Hab.* Nicaragua. Mus. Philadelphia, Washington.

*S. casicolus*, Cope.

Dorsal scales very minute; occipital granular, frontal keeled. Supranasal plates as long as broad. Muzzle elongate. Auricular aperture larger than digital pallet. Dark brown rufous, with three distant, transverse, dorsal blotches, bordered with lighter; the anterior or interscapular indistinct. A dark spot upon the nape, bounded by two light dots. Numerous short longitudinal white lines upon the dorsal and lateral regions; none upon the head. A loreal and three postocular dark lines. Beneath whitish, chin and sides of neck punctulated with rufous.

*Hab.* Region of the Truando, New Granada. Mus. Washington.

*bb.* Inferior labials (anterior to posterior border of orbit) six; muzzle more acute.

*S. oxyrhinus*, Gosse.

Muzzle acute, depressed; supranasals in contact. Above light brown, with numerous conspicuous black dots (sometimes confluent, according to Mr. Gosse); two light dots, bordered with black, at the base of tail. Belly light brown, throat dotted. Tail long. Pupil round.

*Hab.* Jamaica. Mus. Washington.

*S. alopex*, Cope.

Muzzle very acute, profile sloping regularly from the frontal region. Supranasal plates separated. Pupil apparently elliptic. Tail much longer than body. Dorsal scales smaller than in *oxyrhinus*. Above rufous gray, closely vermiculated with longitudinal rufous lines; tail and extremities spotted with the same. Beneath pale brownish, faintly vermiculated with rufous brown on the gular region and the sides of the neck; many of the abdominal and femoral plates margined with the same.

*Hab.* Near Jeremie, Hayti. Mus. Cambridge.

*aa.* Dorsal scales equal to the ventral.

*b.* Occipito-nuchal scales larger than those on the muzzle; palpebral spine absent or rudimentary.

*S. richardsonii*, Gray.

Cranial and gular scales tuberculiform. Supranasal plates narrow; symphyseal broad posteriorly, bordered by three scales. Dorsal scales in about eighteen rows, their keels very strong. Pupil slightly elliptic, (Gosse.) Color, in spirits, light brown, with seven narrow, irregular, brown cross bands, bordered behind with paler; these are the outlines of broad bands, which are, in life, according to Mr. Gosse, reddish lilac. These are succeeded by darker bands on the tail, which become black at its extremity. Limbs annulated. A narrow cross band on the nape, two on the occiput. A light curved frontal cross band; a similar one anterior to the eye, one posterior, one infero-posterior to it; a transverse postfrontal band. These headbands are bright yellow in life, (Mr. Gosse.)

*Hab.* Jamaica. Mus. Washington.

\* Dr. Hallowell's statement, Pr. A. N. S., 1860, p. 480, that the ventral scales are keeled, appears to be incorrect.

*bb.* Occipito-nuchal scales smaller than those on the muzzle; palpebral spine distinct.

*c.* Gular scales keeled.

*S. macrolepis*, Günther.

Muzzle short, rostral and supranasal plates moderate, the latter not in contact. Head scales all keeled; interaxillary dorsal scales in twenty rows. Labial plates  $\frac{3}{4}$ ; symphyseal narrowed posteriorly. ♂ Above brown, many of the scales tipped with darker; sometimes a few black spots on the median line. An irregular median rostral streak, which subdivides anterior to the orbits; the resulting two diverge on the occiput and unite on the nape, enclosing an elongate black subgemmiform spot. The modifications of this pattern are various. A postocular streak extending nearly to the shoulder, and an inferior line extending to the auricular opening. Chin vermiculated with black; tail speckled above and below. ♀ Four longitudinal lines broken into spots; an interscapular spot with two white in it; a black nuchal spot, connected or not with a longitudinal line on each side, which unite or not on the muzzle, and which are in contact or not with a round median occipital spot. Chin not spotted. Both sexes whitish beneath.

*Hab.* Island St. Thomas. Mus. Philadelphia, Washington.

*cc.* Gular scales smooth.

*S. notatus*, Baird.

Muzzle rather short; supranasal plates not in contact; symphyseal broad posteriorly. Labials  $\frac{4}{4}$ ; frontal scales keeled, dorsal interaxillary in from seventeen to twenty-two rows. Tail longer than body. Color reddish brown, with faint darker markings on the back, indicating longitudinal streaks. A median longitudinal line upon the head, which expands posteriorly; a superciliary, three postocular and a loreal line; the first mentioned extend for a greater or less distance posteriorly; in some specimens (among them the types) these lines are broken into small spots.

*Hab.* Key West, Florida; New Providence I., Bahamas; Cuba. Mus. Philadelphia, Washington, Salem, Mass.

*S. gilvitorques*, Cope.

Muzzle short; supranasal plates not in contact; symphyseal narrow behind. Labials  $\frac{3}{3}$ ; frontal scales keeled; dorsal interaxillary in about sixteen rows. Color dark brown above, with a yellow collar just anterior to the interscapular region. Head darker, marked with narrow lines as follow; one median, one superciliary, one loreal, two postauricular: beneath a little paler.

*Hab.* Jamaica. Mus. Philadelphia.

\*\*Lateral dorsal scales larger than the median, keeled.

*S. fantasticus*, Cuv.

Muzzle short; labials  $\frac{3}{3}$ ; rostral bordered posteriorly by four scales; nasal plate lateral; symphyseal rhombic. Color yellowish, the head black, vermiculated with white lines.

*Hab.* Martinique.

*S. anthracinus*, Cope.

Size large, (head and body 1 inch 9 lines;) muzzle elongate acute; labials four above, two large and three small below; supranasal plates small, superior; frontal scales keeled; the dorsal strongly keeled, rounded, in ten rows on each side, extending for a considerable distance on the tail. Gular scales smooth. Color black, the large dorsal scales tinged with blue.

*Hab.* Mexico. Mus. Philadelphia.



## Synopsis of the SILLAGINOIDS.

BY THEODORE GILL.

Family SILLAGINOIDE Richardson.

*Synonymy.*Sillaginidæ *Richardson*, Report of 15th Meeting B. A. A. S., 1846, p. 223.Gobioides part. *Cuvier*, Regne Animal, ed. i.Percoides part. *Cuvier*.Sillagoidei *Bleeker*.Sciæuoidei (Sillaginiformes) part. *Bleeker*.Trachinoidæ part. *Günther*.

The body is elongated and little compressed, highest under the first dorsal fin, and thence nearly uniformly and slowly attenuated towards the caudal peduncle, which is moderately slender. Scales of moderate or small size; their external margins are generally rounded and pectinated. Lateral line simple, with a slight sigmoidal flexure and continued to the base of the caudal fin, or even slightly between its median rays. Head oblong or elongated, conical in profile, gradually decreasing in width above to the horizontally rounded snout, and nearly plane below. Forehead flattened or little convex. Eyes submedian. Nostrils double, approximated and in front of the eyes. Suborbital bones not articulated with the preoperculum. Preorbital bone very large, expanded over the side in front of eye, and entirely concealing the ends of the maxillary bones. A ridge is continued obliquely from the posterior suborbitals on the preorbital. Preoperculum much longer than high, with a prominent longitudinal fold, which, above the inferior horizontal border especially, is separated by a deep channel from the incurved portion which forms the inferior flattened surface of the head. Operculum short and thin. Interoperculum and suboperculum normally developed. Operculum with a slight crest ending in a spine. Mouth small and terminal; the periphery of each jaw more or less semi-elliptical. Intermaxillary bones little protractile downwards, with their ascending and marginal branches nearly equally developed. Supramaxillaries widest at their free ends and forming part of the arcade of the mouth. Teeth on the jaws and the front of the vomer. Branchiostegal membrane free, extending under the throat, but emarginated behind, and concealed under the opercular apparatus. Branchiostegal rays six on each side. Pseudobranchiæ present. Dorsal fins two; the first short; the second elongated and equal to or little larger than the anal, with which it is coterminous. Anal fin with two (or one) small spines. Caudal fin emarginated, with its lobes rounded. Pectoral fins normally inserted on the humeral cincture, with the lower rays branched. Ventral fins thoracic, with one spine and five branched rays. The fins have few or no scales.

The skull is convex below, and has muciferous cavities like that of a Sciænoïd. The pubic bones are well developed and separated from each other before by a sinus between the pedicles, by which they are suspended to the coracoid bones. There are thirty-four to forty-three vertebrae, of which twelve to sixteen are costiferous. The stomach is caecal; the pyloric caeca few (2-5).

The air bladder is simple. The ovaries are generally united nearly in a single mass.

This family is distinguished from all others by the combination of an elongated body, and elongated and nearly equal second dorsal and anal fins, with an oblong or elongated cavernous head, whose preorbital bones are very large, and whose preoperculum is bent inwards below, covering the inferior surface of the head, while a crest or fold separated by a deep groove assumes the aspect of the usual inferior margin.

It manifests more or less resemblance to several families, but its true relationship is rather difficult to be decided.

1861.]

By its cavernous skull, it suggests the Sciænoids and the *Acerinæ* among the Percoids, but from both, it is at once separated by the long anal fin which is nearly equal to the dorsal, and by other morphological and anatomical characters, which the description of the family given above will at once suggest.

Among the Percoids, it most resembles the species usually known under the name of *Acerina schraitzer*,\* but as will be readily learned on comparison, the resemblance is simply analogical.

Among the Sciænoids, the most analogous forms appear to be the genera *Pachypops* of Gill, and *Pachyurus* of Agassiz, or *Lepipterus* of Cuvier. The squamation of the fins, characteristic of the Sciænoids, in addition to the shortness of the anal fin of those genera, and the peculiarly dense squamation of the caudal fin of *Pachyurus*, evidently show that they are true Sciænoids and exclude the entertainment of any strict or close affinity to the Sillaginoids.

From the Trachinoids and the allied forms with which the family has been associated by Dr. Günther, it is at once separated by the form and structure of the head.

Originally referred by Cuvier to the family of Gobioides, it was subsequently transferred to the division of the Percoides with thoracic ventrals, less than seven branchiostegal rays, and provided with two dorsal fins. The only other genus referred to that section was *Trichodon*.

Sir John Richardson, in his Report on the Fishes of the Chinese and Japanese waters, framed for it a new family, but subsequently placed it in his family of Uranoscopidæ.

Dr. Bleeker also, at one time, appears to have regarded the family as valid, and named it Sillagoidei. In his recent classification, he has removed it to the family of Sciænoids, and thus arranged it:

#### Familia 84. SCIÆNOIDEI—SCLÆNINI Bp.

##### Subfamilia 1. ACERINÆFORMES.

Gen. ACERINA Cuv., COPTODON Gervais.

##### Subfamilia 2. SILLAGINIFORMES.

Gen. SILLAGO Cuv., SILLAGINICHTHYS Blkr., ASPRO Cuv.

##### Subfamilia 3. SCIÆNIFORMES.

Gen. All Sciænoids of Günther, except Conodon and Eleginus, the former of which is a Pristipomatoid and the latter a Notothenioid.

The characters which distinguish the Sillaginoidæ from the Sciænoidæ have been previously enumerated. The differences existing between them and *Aspro* are still more decided. As previously remarked, the resemblance to *Acerina* is much greater. The genus *Coptodon* is not at all related to *Acerina*, but is a synonyme of *Tilapia*, the type of which is closely allied, if not identical with the *Chromis niloticus* of Cuvier.†

#### SILLAGO, Cuv.

##### *Synonymy.*

Sillago Cuv., Regne Animal, ed. i., vol. ii., p. 258, 1817.

" Cuv. et Val., Histoire Naturelle des Poissons, vol. iii., p. 398.

\*The *Acerina schraitzer* appears to be the type of a distinct genus, to which the name of *Leptoperca* may be given. The genus differs from the restricted *Acerina* by the more slender body and head, and longer dorsal and anal fins.

†The name of *Chromis* cannot be retained for the *C. niloticus*, as the type of that genus is the *Sparuschromis* of Linné, (see Mem. du Museum d'Hist. Nat., tome i., p. 353, 355.) The name of *Tilapia*, though proposed by Sir Andrew Smith, under an erroneous view of its affinities, may be then accepted. The reference by Gervais of a species of the genus to *Acerina*, as was originally the case, is, to use the mildest expression, singular.

*Atherina* sp. *Forspalls*.

*Platycephalus* sp. *Bloch, Schneider*.

*Sciæna* sp. *Bloch, Schneider*.

*Diagnosis*.—Dentes velutini. Pinna dorsalis prima spinis 11 (12); secunda et analis subæquales. Squamæ mediocres, serie longitudinali 50—90.

Body elongated and slightly compressed, rounded and widest on the back, and more or less plane below. Scales on the side of moderate size, (50—90.) Head elongated-conical, compressed, gradually and nearly uniformly narrowed to the snout, which is horizontally rounded; eyes moderate or large and submedian. Mouth small, the periphery of the jaws semi-oval; jaws subequal, or lower shortest. First dorsal fin decreasing in a straight or convex line from the front or anterior rays, and with eleven, rarely twelve, spines. Anal fin with two slender spines, nearly equal to the second dorsal in extent and number of rays. (D. I. 17—23, A. II. 15—23.) Caudal fins emarginated. Ventral fins with the spine sometimes cartilaginous.

Type. *Sillago sihama*, *Rüppell*.

*Syn*.—*Sillago acuta* *Cuv*.

*Sillago* is now restricted to the species having similar forms, scales of moderate size and nearly equal dorsal and anal fins; and it consequently excludes some species that have been referred to it by previous naturalists, the *Sillago punctatus* being taken as the type of one, and *S. domina* as that of another genus. Even in the genus as now restricted, there are more considerable variations than are often found in the same genus. While the ventral spine is slender, and, as usual, osseous in most species, it is in one thick and cartilaginous. Again, some species have cycloid scales in the cheek and forehead, while others have ctenoid. The preoperculum is almost entire in some, while in others it is ciliated. As these differences do not, however, appear to be supported by others, they perhaps can scarcely be regarded as generic, and the species so distinguished have been therefore retained in the same genus.

The following analytical table will exhibit the range of variation in the genus, but, perhaps, is artificial, and may not show the affinities of all.

I. Anal rays I.—II. 19—23.

A. Ventral spine slender and osseous.

a. Cheek and interocular scales cycloid.

b. Scales large, 50—55 along lateral line. *S. macrolepis*.

bb. Scales moderate, 70—75 along lateral line.

Rows above lateral line 4, D. XI, I., 20, 21, A. I.

II. 22, 23.

Body and fins immaculate.

*S. sihama*.

Body immaculate; second dorsal spotted.

*S. malabarica*.

Rows above lateral line 5, 6. D. XI. I. A. I. II.

19—21.

Body immaculate; dorsal spotted between rays. *S. bassensis*.

Back spotted. First dorsal brownish above,

dotted below; second margined with

brown, and with two longitudinal vittæ;

caudal with three transverse orange vittæ. *S. maculata*.

aa. Cheek and interocular scales ctenoid.

Scales of lateral line 70—75; above three rows.

*S. japonica*.

Scales of lateral line 82—86; above seven rows.

*S. parvisquamis*.

AA. Ventral spine thick and cartilaginous, united with the

first ventral ray.

*S. chondropus*.

II. Anal rays II. 15, 16 (18 *Cuv. et. Val.*)

First dorsal marbled with blackish; second with four or

or five rows of oblong spots.

*S. ciliata*.

The following enumeration gives the synonyms of each species, the work in which it was first described, and the habitat.

It is proper to remark that the *Sillago sihama* and *S. malabarica* have been united by Dr. Günther under the name of *S. sihama*, and that *S. bassensis* and *S. maculata* have been also regarded as identical, and described under the latter name. Dr. Günther may be correct in his views, but as he has given no reasons to support them, and as there are well marked differences between those forms, which are generally specific, we prefer, with previous naturalists, to retain them as distinct, until it is demonstrated that their variations are of less value in this group than in most others. Dr. Günther's descriptions are also as restrictive as those of others, that of *Sillago sihama* applying to the one here retained as such, and the one of *S. maculata* rather to *S. bassensis*.

1. SILLAGO MACROLEPIS, Bleeker.  
*Sillago macrolepis Bleeker*, *Natuurkundig Tijdschrift voor Nederlandsch Indie*, vol. xvii. p. 166.  
*Habitat*.—Seas of Batavia and Bali.
2. SILLAGO JAPONICA, Temminck et Schlegel.  
*Sillago Japonica Temm. and Schlegel*, *Fauna Japonica Pisces*, p. 33, pl. x. fig. 1.  
*Habitat*.—Japanese and Moluccan seas.
3. SILLAGO SIHAMA, Rüppell.  
*Atherina sihama Forskal*, *Descriptiones Animalium, &c.*, p. 70.  
*Platycephalus sihama Bloch*, *Systema Ichthyologicæ*, Schneid. ed., p. 60.  
*Sillago sihama Rüppell*, *Atlas zur der Reise im Nördl. Africa, Fische*, p. 9, taf. 3, fig. 1.  
*Sillago erythræa Cuv. et Val.*, *Hist. Nat. des Poissons*, tom. iii. p. 409.  
*Habitat*.—Red Sea.
4. SILLAGO MALABARICA, Cantor.  
*Sciæna malabarica Bloch*, *Systema Ichthyologicæ*, Schneid. ed., p. 81, pl. 19.  
*Soring Russell*, *Desc. and Fig. of Fishes of Coromandel*, tom. 113.  
*Sillago acuta Cuv. et Val.*, *Hist. Nat. des Poissons*, tom. iii. p. 400.  
*Habitat*.—East Indian and Chinese seas.
5. SILLAGO MACULATA, Quoy and Gaimard.  
*Sillago maculata Quoy and Gaimard*, *Voyage de Freycinet, Zoologie*, p. 261 pl. 53, fig. 2.  
*Habitat*.—East Indian and Australian seas.
6. SILLAGO BASSENSIS, Cuv. et Val.  
*Sillago bassensis Cuv. et Val.*, *Hist. Nat. des Poissons*, tom. iii. p. 412.  
*Habitat*.—Coasts of South Eastern Australia.
7. SILLAGO PARVISQUAMIS, Gill.  
*Habitat*.—Japanese seas.
8. SILLAGO CHONDROPUS, Bleeker.  
*Sillago chondropus Bleeker*, *Verhand. von bet Bataav. Genoots*, chap. deel. xxii. *Percoiden*, p. 61.  
*Habitat*.—Molluscan and Japanese seas.
9. SILLAGO CILIATA, Cuv. et Val.  
*Sillago ciliata Cuv. et Val.*, *Hist. Nat. des Poissons*, tom. iii. p. 415.  
*Habitat*.—Australian seas.

SILLAGINODES, Gill.

*Synonymy.*

*Silago* sp. *Cuv. et Val., Günther.*

*Diagnosis*.—Dentes velutini. Pinna dorsalis prima postice oblique recta vel

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decurvata, spinis 12; secunda p. anali majori, radiis I. 26. Squamæ minimæ, serie longitudinali 170 plus minusve.

Body elongated and scarcely compressed, with the back as well as the abdomen more or less rounded. Scales of the body very small, there being 170 in a longitudinal row in the typical species. Head elongated-conical, compressed, gradually and nearly uniformly decreasing in width to the snout; eyes moderate and submedian. Mouth small; the periphery of each jaw semi-oval; jaws subequal, or lower shortest. First dorsal fin declining from the anterior portion in a straight or convex line, and with twelve spines. Second dorsal longer, and with more rays than the anal (I. 26.) Anal fin with one slender spine, and about twenty-two branched rays. Caudal fin emarginated. Ventral fins with a slender spine.

Type. *Sillaginodes punctatus*, Gill.

The most apparent distinctive characters of this genus are the small size of the scales, and the inequality, in size and number of the rays, of the second dorsal and anal fins. Although the second dorsal fin of the typical *Sillagines* is sometimes longer than the anal fin, the number of its rays is always the same or nearly so, and only in the *Sillago ciliata* is the dorsal longer than the anal. One species is known.

SILLAGINODES PUNCTATUS, Gill.

*Sillago punctata* Cuv. et Val. Hist. Nat. des Poissons, tom. iii. p. 413.

*Habitat.*—Australia.

SILLAGINOPSIS, Gill.

*Synonymy.*

*Sillago* sp. Cuv. et Val., Günther.

*Diagnosis.*—Dentes velutini, serie externa majores. Piuna dorsalis anterior spinis 9, spina secunda elongata, postice oblique incurvata.

Body elongated and subcylindrical. Scales small. Head elongated, depressed and declining towards the snout in a nearly straight line; its width gradually becomes less towards the nostrils, and thence the snout is more attenuated and rounded at its end; eyes very small and placed in the anterior half of the head. Mouth small. Lower jaws shorter than the upper. Teeth of the jaws pluri-seral, larger in the external row. Spinous dorsal fin commencing above the pectorals, with nine rays, the second of which is much elongated; second dorsal elongated, with its height gradually decreasing. Anal fin shorter than the soft dorsal, and nearly co-terminal with it. Caudal fin emarginated. Ventral fins with a slender spine.

Type. *Sillaginopsis domina*, Gill.

*Syn.*—*Sillago domina* Cuv. et Val.

This genus is very distinct from either *Sillago* or *Sillaginodes*, and is distinguished from both by the depressed head, the small eyes, the larger outer row of teeth, and the form of its first dorsal fin.

A single species is known.

SILLAGINOPSIS DOMINA Gill.

*Sillago domina* Cuv. et Val. Hist. Nat. des Poissons, tom. iii, p. 415, pl. 69.

*Habitat.*—Bay of Bengal and East Indian Archipelago.

#### Description of a new species of SILLAGO.

SILLAGO PARVISQUAMIS Gill.

The body is slender and highest under the first dorsal fin, the height there equalling an eighth (12-100) of the total length; under the second, it gradually diminishes, and the height of the constricted caudal peduncle is only a twentieth (5-100). The greatest width nearly equals a tenth of the length; behind, it becomes regularly compressed to the caudal fin.

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The head has the same form as in the typical species; the curvature above is very slight. Its length forms less than a quarter (23-100) of the total; the length of the snout or interval between the symphysis of the upper jaw and the eye exceeds an eleventh ( $.9\frac{1}{2}$ -100) of the same; that of the exposed operculum, 4-100. The height at the occiput equals a ninth (11-100) of the total length, or nearly half (11-23) of the head's; the width is much less than the height ( $9\frac{1}{2}$ -100), and regularly diminishes towards the snout, where it equals a half of the greatest. The interorbital area is perfectly flat, and its width exceeds the length of the operculum ( $.04\frac{1}{3}$ ).

The eyes are nearly central and oval; the long diameter is contained more than eighteen times in the total ( $.05\frac{1}{2}$ ) or four times in the head's; the short diameter twenty-five times (4-100) in the former and nearly six times in the latter.

The scales on the crown and forehead, as well as on the cheeks and opercula, are ctenoid.

The mouth is very small; the periphery of each jaw semi-elliptical; the lower jaw is received within the band of teeth of the upper.

The teeth are uniform, and in a moderately broad band on each jaw and on the vomer.

The first dorsal fin commences at the end of the third tenth of the total length; its second and third spines are longest and nearly equal an eighth of the total length (8-100); the first and fifth are nearly equal; the outline thence declines with a slight curve to the twelfth.

The second dorsal fin regularly diminishes in height from front to rear; the second or first branched ray equals a tenth (10-100) and the penultimate a twenty-second ( $4\frac{1}{2}$ -100) of the total length.

The anal fin commences before the middle of the total length, and beneath the second or third ray of the second dorsal, and is coterminous with that fin; its two spines are very slender.

The caudal fin is slightly emarginated and its lobes rounded; the median rays form a ninth (11-100) of the total length; the longest nearly equal a seventh (14-100) of the same.

The pectoral fins are nearly equal in length to an eighth (13-100) of the total.

The ventral fins are inserted immediately behind the bases of the pectorals; the first and second branched rays are equally long, and exceed an eighth (12-100) of the fish's length. The spine is slender and bony.

The number and character of the rays of the respective fins are indicated in the following formula:

D. XII. I. 22. A. II. 23. C. 10, 1, 8, 7, 1, 9. P. 2, 14. V. I, 5.

The scales are arranged in very oblique rows, the row from the first ray of the second dorsal ending nearly at the base of the twelfth or thirteenth anal one. The exposed parts are nearly twice as high as wide; there are from eighty-two to eighty-six along the lateral line; between that line and the dorsal fin there are seven rows. All are ctenoid.

The color of the body and head is nearly uniform, tinged with purple above the lateral line and more silvery beneath. The first dorsal fin is very minutely punctulated, especially near the margin and the front of each spine. The rays of the second dorsal are each banded with two or three dark bars, which encroach on the membrane in front. The margin of the caudal is lighter. The pectoral and ventral fins are immaculate.

Total length, 6.3-10ths.....	100
Body—Greatest height.....	12
Least height.....	5
Width .....	$9\frac{1}{2}$
Head—Length.....	23
Length of operculum.....	4

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Length of snout.....	9 $\frac{1}{2}$
Diameter of orbit.....	5 $\frac{1}{2}$
Width between eyes.....	4
Height at occiput.....	11
Width at occiput.....	9 $\frac{1}{2}$
Dorsal—Distance from snout.....	30
Height of second spine.....	13
Height of second dorsal's second ray.....	10
Height of second dorsal's penultimate ray.....	4 $\frac{1}{2}$
Anal—Distance from snout.....	48
Caudal—Length of median rays.....	11
Length of longest rays.....	14
Pectoral—Length.....	13
Ventral—Length.....	12

This species is most nearly allied to the *Sillago Japonica*, which is an inhabitant of the same geographical section, but it is amply distinguished from that species by the more slender and elongated form, the smaller size of the scales, and especially the number of rows above the lateral line, the color and the rows of spots or bars which cross the front of the rays of the second dorsal fin. *Sillago Japonica* has also eleven dorsal spines, while the specimen of *S. parvisquamis* here described has twelve.

It best agrees with *Sillago maculata* and *S. bassensis* in the number of rows of scales between the lateral line and dorsal, but the number is even greater than in those species in which also there are only about seventy scales on the lateral line, and five or six rows above. The scales of the cheeks are also cycloid and not ctenoid as in the present.

Finally, *Sillago parvisquamis* is distinguished among all the representatives of the genus as now restricted by the small size of the scales, and, if constant, by the number of dorsal spines, it having twelve, like the *Sillaginodes punctatus*, while all others have eleven.

A single specimen, somewhat damaged, is in a small collection of fishes made by Dr. D. B. Simmons, at Kanagawa. It is preserved in the museum of Mr. Brevort, to whom I am indebted for the privilege of describing it.

### Synopsis of the CHÆNICHTHYIDS.

BY THEODORE GILL.

Family CHÆNICHTHYOIDÆ Gill.

#### *Synonymy.*

Gobiidæ part. *Richardson.*

Callionynioidei part. *Bleeker.*

Blennioidei (Comephoriformes part.) *Bleeker.*

Trachinidæ (Trachinina part.) *Günther, 1860.*

Trachinidæ (Nototheniina part.) *Günther, 1861.*

*Acanthopterygii corpore elongato nudo, subcylindrico buccis inermibus, capite occipite subplano, rostro elongato spatuliforme, ore terminale, magno; palato lævi; aperturis branchialibus amplis membrana branchiostega radiis sex sustentata, pinnis dorsali analique elongatis, portione spinosa pinnæ dorsalis articulata separata conjunctare; pinnis pectoralibus radiis ramosis; pinnis ventralibus jugalaribus et remotis, radiis l. 5; ventriculo ovali, ramo brevi ascendente; cæcis pyloricis paucibus.*

Body rather elongated, gradually and regularly declining from the nape to the caudal fin; anteriorly subcylindrical or scarcely compressed. Skin naked. Lateral line high on the sides and near the dorsal fin, interrupted near the end of the latter. Head moderate or large, with the snout prolonged and spatuliform. 1861.]

Crown depressed and not relieved by crests or ridges. Preorbital bones large; infraorbital chain very narrow, and not articulated with the preoperculum. Opercular bones all present; the interoperculum and suboperculum are moderately developed. Mouth terminal, with the cleft lateral and large, extending to the vertical of the eye. Upper jaw with its arch formed in front almost entirely by the intermaxillary bones, whose pedicles or posterior processes are very short. Supramaxillary bones with their articulations entirely posterior to the intermaxillary slender and gradually enlarged towards their extremities. Teeth developed on the jaws. Palate smooth and unarmed. Branchial apertures capacious. Branchiostegal membrane inferiorly deeply emarginated behind, and provided on each side with six rays. Pseudobranchiæ developed. Dorsal fin with its spinous portion short and usually distinct from the soft. The rays of the latter are (often) simply articulated and not branched. The anal fin is little shorter than the dorsal, and its rays are divided, with the membrane notched behind each. Caudal fin not forked. Pectoral fins well developed, and with their inferior rays divided. Ventral fins jugular or subjugular, separated by a rhomboid area; each with a spine and five rays, the first of which are frequently thickened and entire. The cranium is flattened behind, and the crests are little developed or obsolete. The spatuliform snout is principally formed by the elongated frontal bones. The stomach is of moderate size and cæcal. The pyloric caeca are in very small number.

The chief distinctive characteristic of this family is doubtless the spatuliform extension of the snout. This combined with the extent of the fins, structure of the head and general form, distinguish the group from all others. It appears to be most closely allied to the Harpagiferoids and Notothenioids. From the former, it is separated by the form of the head as well as by that of the body. From the latter, by the same features, and also by the naked skin.

The representatives of this family, or at least *Chaenichthys*, were at first placed by Sir John Richardson in the Cuvierian family of Gobioids, between *Hæmerocætes* and *Comephorus*. Subsequently, in his memoir on Ichthyology published in the *Encyclopædia Britannica*, he removed *Hæmerocætes* to his family of *Uranoscopoidæ*, and retaining *Chaenichthys* in that of *Gobiidæ*, placed it after *Comephorus* as the last of the family.

Dr. Bleeker, in his "Systematis Piscium Naturalis Tentamen," widely separated the two groups which are here referred to the family, thus distributing them.

Caterva 2. Platycephalichthyes.

Ordo 33. Platycephali.

Familia 118. (2d of order) Callionymoidei = Callionymini, Bp.

Gen. *Callionymus* L., *Harpagifer*, Richds., *CHAENICHTHYS*, Richds.

Caterva 3. Blennii.

Ordo 34. Cotti.

Familia 123 (3d of order) Blennioidei.

Subfamilia 4. Comephoriformes.

Gen. *Comephorus* Lac., *PAGETODES*, Richds., an *huj* loc.

Dr. Günther at first referred *Chaenichthys* to the group *Trachinina* of his family of *Trachinidæ*, but subsequently transferred it to that of *Nototheniina*, formed for *Notothenia*, *Harpagifer* and *Chaenichthys*.

The family has scarcely any affinity to either the Callionymoids or Blennoids. Besides the form of the head as well as that of the body, it differs from the former, especially by the relative situation of the ventral fins and the extent of the branchial apertures. It is also still distinguished from *Comephorus*, which is the type of a peculiar family little allied to Blennoids, by the structure of the head, the presence of ventral fins, and the development of the pubic bones. It appears, however, to be allied to the Comephoroids, but certainly not as much so as to the Harpagiferoids, or even the Notothenioids. Like its nearest relations, all the representatives of this family are inhabitants of high southern

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latitudes, where they apparently represent the Cottoids of the north, especially the *Oncocottii*. They appear to belong to two natural subfamilies, but one of them is very imperfectly known.

Subfamily CHÆNICHTHYINÆ Gill.

*Synonymy.*

Trachinina part. (group) *Günther*, Catalogue of the Acanthopterygian Fishes.  
 Nototheniina part. (group) *Günther*, Annals and Magazine of Natural History.

Pinna dorsalis prima a pinna secunda disjuncta. Pinnæ dorsalis secunda analisque sat altæ; prior radiis non ramosis. Pinnæ pectorales basibus latis et emarginatis. Pinnæ ventrales utraque radiis spinosa una et quinque articulatis, externis simplicibus, internis ramosis.

First dorsal fin separated from the second. The latter and the anal are moderately elevated and of nearly uniform height. The rays of the second dorsal are simply articulated.

Pectoral fins with their bases broad and subvertical, but emarginated.

Ventral fins well developed and provided with a spine and five soft rays as usual, but with the external of the latter simple and the internal alone branched.

The subfamily of Chænichthyinæ is thus restricted to the genus *Chænichthys* as recently extended by Dr. *Günther*. Only two species are known, each of which represents a distinct genus.

Genus CHÆNICHTHYS Richardson.

*Chænichthys Richardson*, Annals and Magazine of Natural History, 1844.

*Chænichthys Richardson*, Ichthyology of the Voyage of the Erebus and Terror, p. 12.

*Chænichthys Günther*.

Linea lateralis scutellis parvis armata. Rostrum spina recurvata munita. Pinna dorsalis prima secunda bene separata, alta, spinis septem sustentata.

Lateral line armed with small osseous scutellæ. Snout provided with a recurved spine. Teeth cardiform, in a band in each jaw. First dorsal fin not contiguous to the second, elevated and provided with about seven radiating spines. Caudal fin convex or subtruncated. Pectorals fins with its hinder border subtruncated above and obliquely convex below. Ventral fins well developed, and about as long as the pectoral.

*Chænichthys* is here retained with the same limits assigned to it by Sir John Richardson and by Dr. *Günther* in his "Catalogue of the Acanthopterygian Fishes." Subsequently, there was referred to it, by the latter gentleman, a species which does not agree with the characters originally given to it, and which appears to be the representative of a different genus.

CHÆNICHTHYS RHINOCERATUS, Richardson.

*Chænichthys rhinoceras Rich.*, Ichthyology of the Erebus and Terror, p. 13, pl. vi., figs. 1, 2, 3.

This species is found among the kelp weed on the shores of Kerguelen's Land, and attains a length of nearly two feet. Specimens were caught by the hook.

Genus CHAMPSOCEPHALUS, Gill.

*Chænichthys* sp. *Günther*, (1861.)

Linea lateralis inerme. Rostrum spina obsoleta. Pinna dorsalis spinosa secundæ approximata, spinis decem munita.

Lateral line unarmed, formed by small tubules. Snout with no spine. Teeth of the jaws cardiform. First dorsal fin contiguous to the second, as long, or longer, than high, sustained by ten spines. Caudal fin subtruncated or scarcely convex. Pectoral fins large, subtruncated behind, above and below obliquely convex. Ventral fins well developed, and about as long as the pectoral.

1861.]

*Champsoccephalus* is readily distinguished from *Chænichthys* by the absence of plates along the lateral line, and the different form of the dorsal fin.

CHAMPSOCEPHALUS ESOX Gill.

*Chænichthys esox* Günther, Annals and Magazine of Natural History.

*Habitat*.—Port Famine.

Subfamily PAGETODINÆ Gill.

Pinna dorsalis pone nucham incipiens, parte spinosa vix vel non articulata discreta. Pinnæ ventrales longæ et graciles.

Dorsal fin commencing close behind the nape, with no marked distinction between the spinous and articulated portions. Both the dorsal and anal fins are represented to be low. Ventral fins long and slender.

As the genus *Pagetodes* is only known by an unfinished drawing, made during the voyage of the *Erebus* and *Terror*, its characters are very imperfectly ascertained, and it may even belong to a different family from *Chænichthys*, but it is improbable that such is the case; its physiognomy is quite similar to that of the latter genus, and the characters, if correctly represented, will be doubtless found to be of secondary value, as above considered, and not indicative of family rank.

The species for which the subfamily is established is an inhabitant of high Southern latitudes. "When the ships were in the high latitude of  $70^{\circ}$ ,  $10'$  S., and longitude  $178\frac{1}{2}^{\circ}$ , a fish was thrown up by the spray in a gale of wind against the bows of the *Terror*, and frozen there. It was carefully removed for the purpose of preservation, and a rough sketch was made by the surgeon, John Robertson, Esq., but before it could be put in spirits, a cat carried it away from his cabin and ate it." In allusion to the manner in which it was discovered, Sir John Richardson has thought fit to name it *Pagetodes*.

It is difficult to believe that the dorsal and anal fins are as low as represented in the figure of the species, nor can the opercular region be represented correctly. The drawing is certainly very unsatisfactory for the establishment of a distinct group, but as the genus has been named, it is advisable to correctly classify it in order that it may not be renamed, at the same time premising that its arrangement is entirely provisional, and that it may possibly even prove to belong to the same group as *Chænichthys*.

Genus PAGETODES Richardson.

*Pagetodes Richardson*, Ichthyology of the *Erebus* and *Terror*, p. 15.

Rostrum inerme. Pinnæ pectorales obliquiter truncatæ. Pinna caudalis emarginata.

Snout unarmed. Teeth in each jaw conspicuous. Dorsal and anal fins low. Caudal fin emarginated. Pectoral fins moderate, behind obliquely truncated downwards and forwards, rounded at their upper angle. Ventral fins very slender and tapering.

PAGETODES.

*Pagetodes Rich.*, Ichthyology of the *Erebus* and *Terror*, p. 15, pl. 8, fig. 3.

### Synopsis of the HARPAGIFEROIDS.

BY THEODORE GILL.

Family HARPAGIFEROIDÆ Gill.

*Synonymy*.

Goboidæ part. *Richardson*.

Callionymoidei part. *Blecker*.

Trachinidæ (*Pseudochromides* part. *Günther*, 1860.

Trachinidæ (*Nototheniinæ*) part. *Günther*, 1861.

*Acanthopterygii cottoidei* buccis inermibus ; membrana branchiostega radiis 6 sustentata ; pinnis dorsali analique elongatis, pinna dorsali radiis spinosis paucibus pinnam parvam distinctam formantibus ; pinnis pectoralibus radiis inferioribus ramosis ; pinnis ventralibus jugularibus, sat remotis, radiis 1, 5 ; ventriculo cæcali, cæcis pyloricis paucibus.

Body oblong, generally highest under the first dorsal fin, subcylindrical or even depressed in front, with the caudal peduncle moderate. Skin naked. Lateral line high on the sides, ending near the termination of the second dorsal, continued in front on the head, and connected by a transverse nuchal line with the opposite one. Head moderate, depressed and subcordate or subrhomboid above. Preorbital bones moderate and lateral: infraorbital small and not connected with the preoperculum. Opercular bones all present. Operculum and suboperculum spinigerous. Mouth terminal, with the cleft moderate and lateral, extending near or beneath the eyes. Upper jaw with its arch chiefly formed by the intermaxillary bones, which are scarcely protractile and have very short posterior processes. Supramaxillaries expanded towards ends. Teeth on the jaws. Palate unarmed. Branchial apertures principally lateral. Branchiostegal membrane beneath emarginated behind, and sustained on each side by six rays. Pseudobranchiæ developed. Dorsal fin double, with a short spinous portion distinct from the soft, and partly above the bases of the pectorals. Anal fin shorter than the second dorsal. Caudal fin not forked. Pectoral fins well developed, and with its inferior rays branched. Ventral fins jugular, separated by a rhomboid area, and with a spine and five branched rays. The cranium has only "a very short occipital spine, which does not rise above the hind head, and is not visible in the recent fish." The vertebræ are in increased number ( $\frac{10+x}{14+y}$ ); the vertebral

column of *Harpagifer bispinis* has eleven abdominal, and, according to Richardson, twenty-four caudal, but Günther was unable to find more than eighteen. The stomach is cæcal, and the pyloric branch has a few appendages. The air bladder is obsolete.

This family is readily recognizable by its cottoid form, combined with small suborbital bones, armed opercula, perfect and jugular ventral fins, branched lower pectoral rays, and elongated dorsal and anal fins, the former of which has its spinous rays forming a small separate fin. Its lateral line, connected at the nape to its fellow, is also one of its most distinctive characters.

The nearest allies appear to be the Chænicthyoids, Notothenioids, Bovichthyoids, and more remotely the Callionymoids.

From the Chænicthyoids, the Harpagiferoids are principally distinguished by the form of the head and body, and the anterior extension of the lateral line.

From the Notothenioids, by the scaleless body and armed opercula, and the different physiognomy.

From the Bovichthyoids, they are separated by the branched inferior rays of the pectoral fins, unarmed palate and small first dorsal fin.

From the Callionymoids, they are still more widely removed by the structure of the head, the form of the pubic bones, and the corresponding relations of the ventral fins, the greater development of the dorsal and anal fins and structure of the anal, as well as by the larger branchial apertures, cæcal stomach, and pyloric cæca.

The only known genus was placed by Richardson near *Callionymus*.

Dr. Bleeker regarded *Callionymus*, *Harpagifer* and *Chænicthys* as members of the family of Callionymoidei.

Dr. Günther referred it to the family Trachinidæ and group Pseudochromides, and afterwards to the group Notothenina, together with *Notothenia* and *Chænicthys*.

The Harpagiferoids are confined to the seas of high southern latitudes, and there appear to represent the Cottoids of the boreal seas.

1861.]

## Genus HARPAGIFER Richardson.

*Synonymy.*

Batrachus sp. *Bloch, Schneider.*

Callionymus sp. *Forster.*

Harpagifer *Richardson.* Ichthyology of the Erebus and Terror, p. 11.

Linea lateralis inermis, antice tubulosa, "trans nucham cum pari suo conjugato ramulumque ad orbitam utramque emittens." Operculum spina hamifera sursum armatum. Suboperculum spina subrecta et fere horizontali munitum. Dentes velutini et aggregati ad maxillæ utræque symphysis, lateribus pauciseriati.

Lateral line unarmed, its anterior portion formed by small tubules, inflexed at the nape and joined by a transverse line to its fellow of the opposite side, thence continued to each orbit. Operculum armed above with a hooked or hamiform spine. Suboperculum with a straight horizontal one. Teeth subulate, pluriserial at the symphysis of each jaw, pauciserial on the sides. First dorsal fin sustained by three or four spines. Caudal fin rounded behind. Pectoral fins also rounded behind. Ventral fins with the soft rays all branched, and the second and third longest.

Type. *Harpagifer bispinis Richardson.*

The genus has at most only two known representatives, and perhaps only one, as Dr. Günther has considered as belonging to the same species, forms which have been by Richardson regarded as distinct. Until reasons are given for the support of the belief of their identity, they may be regarded as species, as there appears to be a decided difference in color.

HARPAGIFER BISPINIS *Richardson.*

Callionymus bispinis *Forster.*

Batrachus bispinis *Bloch, Systema Ichthyologiæ, Schneid. ed. p. 45.*

Harpagifer bispinis *Rich.,* Ichthyology of the Erebus and Terror, p. 11, pl. 7, figs. 1-3; p. 19, pl. 12, figs. 8, 9.

D. IV. 22-24. A. 17.

Body dark orange, with three irregular large brown bands; dark above. Fins marbled.

*Habitat.* Falkland Islands.

HARPAGIFER PALLIOLATUS *Richardson.*

Harpagifer palliolatus *Rich.,* Ichthyology of the Erebus and Terror, p. 20, pl. 12, figs. 5-7.

D. III. 22. A. 17.

Body dark orange, with irregular large brown bands; *back with a broad white band, extending from the snout backwards and laterally dilated under the middle and near the end of the soft dorsal.* Fins marbled.

*Habitat.* Falkland Islands.

This is perhaps only a variety of the preceding species as affirmed by Dr. Günther, but as that gentleman appears to have had no better means of ascertaining than Sir John Richardson, it may be retained as distinct until such is proved.

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### Synopsis of the NOTOTHENIOIDS.

BY THEODORE GILL.

Family NOTOTHENIOIDÆ, Gill.

*Synonymy.*

Sciænidæ part. *Cuv. et val.*

Sciænidæ part. *Richardson.*

Gobiidæ part. "

Sciænoidei (Sciæniiformes partim) *Bleeker.*

Gobioidei (Gobiiformes partim) “

Trachinidæ	{ Trachinina part.	} <i>Günther</i> , Catalogue of the Acanthopterygian Fishes, vol ii.
	{ Pseudochromides part.	
Trachinidæ	{ Trachinina part.	} <i>Günther</i> , Annals and Magazine of Natural History.
	{ Nototheniina part.	

*Acanthopterygii* trachinoidei *Eleotriiniis* similes, capite hard cavernoso, pinnis pectoralibus radiis ramosis, pinnis ventralibus jugularibus, *linea laterali elevata* postice vel interrupta, i. e.

*Acanthopterygii* elongati, buccis inermibus, vertebrais  $\frac{10+x}{14+y}$ ; corpore regulariter squamosa; capite lateraler inflata, ossibus hard cavernosis, operculibus integribus, rostro gibbosa, ore terminali, modico; palato lævi; aperturis branchialibus magnis; radiis branchiostegalibus 6; pinnis dorsali analique longis; pinnæ dorsalis portione spinosâ articulatâ separata; pinnis pectoralis radiis inferioribus ramosis; pinnis ventralibus jugularibus, I. 5; stomacho postice expanso, cæcis pyloricis paucibus.

Body oblong or elongated, generally highest at or near the nape, and thence slowly and regularly decreasing to the caudal fin, where it is most compressed; anteriorly subcylindrical. Preanal region generally shorter than the head, rarely longer. Skin covered with regularly imbricated scales of moderate size. Lateral line running high on the sides and near the dorsal fin, rarely uninterrupted; generally terminating near the end of the dorsal, and reappearing along the middle on the sides of the tail, and thence continued to the caudal fin. Head moderate, scarcely or not at all compressed, with the snout moderate and little decurved. Eyes moderate, lateral but partly visible from above. Infra-orbital bones very small, and not articulated with the preoperculum. Opercular bones all present, normally developed and unarmed. Nostrils double, between each eye and the snout; the anterior very small. Mouth terminal, with the cleft lateral, and extending near the vertical of the eye. Upper jaw formed chiefly by the premaxillary bones, which are scarcely protractile, the ascending or posterior processes being very short. Supramaxillary bones expanded towards the ends as usual, mostly retractile under the preorbital. Lips tumid. Teeth acute, present on the jaws. Palatines smooth. Branchial apertures capacious. Branchiostegal membrane below deeply emarginated behind, and provided on each side with six rays. Pseudobranchiæ developed. Dorsal fin double; the spinous portion commences near the nape, is short, and distinct from the soft part; the latter is elongated. Anal fin little shorter than the soft dorsal, and unarmed, with its rays divided like the dorsal, and the membrane notched behind each. Caudal fin moderately developed and not forked. Pectoral fins well developed, with broad bases normally inserted on the scapular arch; its lower rays are branched. Ventral fins jugular, each provided with a spine and five branched rays, the third or fourth of which is generally longest; rarely the second. The cranium is nearly or quite smooth above, and the crests and ridges are rudimentary or obsolete. The vertebræ are in greatly increased number; in one species (*Notothenia purpureiceps*, Rich.) there are forty-six, fifteen of which are abdominal. The stomach is moderate and cæcal. Pyloric appendages are present in small number (3—5).

The family thus characterized is composed of forms that have been by most authors referred partly to the family of Sciænoids and partly to that of Gobioids, but which Dr. Günther has recently placed together in this “family” of Trachinidæ, at the same time distributing them among two of his “groups.”

One of the forms alone was known to Cuvier. He referred it to the family of Sciænoids and named it *Eleginus*. In that family, it had been retained by every naturalist until removed by Dr. Günther. It appears, however, to have very little affinity to any true Sciænoïd, and differs in almost every respect.

Another form was made known by Sir John Richardson under the name of *Notothenia*, and placed by him in the family of Gobioids near *Eleotris*. From that family, as naturally constituted, it decidedly differs by the cæcal stomach, the presence of pyloric appendages, &c.

Dr. Günther, in his Catalogue of Acanthopterygian Fishes, regarding the lateral line as affording distinctive characters, distinguished two of his four groups of the *Trachinidæ* by the continuation of that line to the caudal fin, or its interruption or termination near the end of the dorsal fin.

*Eleginus* having a continuous lateral line was referred to the Trachinina.

*Notothenia*, with an interrupted lateral line, was placed among the æseudochromides.

It appears that the groups so characterized are only technical and artificial, and not natural. The group Trachinina, which is arranged as the second of the family, is composed of the following genera: *Trachinus* L., *Percis* Schneider, *Aphritis* Cuv. et Val., *Sillago* Cuv., *Eleginus* Cuv. et Val., *Epicopus* Günther, *Percophis* Cuv. et Val., *Chænichthys* Rich., *Bovichthys* Cuv. et Val., and *Trichodon* Steller. The genus *Homalopomus* of Girard, it is supposed, may also belong to the group.

As regarded by us, there appear to be several distinct families confounded in this one group. They may be briefly distinguished as follows:

I. Lower pectoral rays simply articulated.

A. Ventral fin thoracic. First and second dorsals subequal.....TRICHODONTOIDÆ.

AA. Ventral fins jugular.

Ventrals approximated. Anal very long.

Body scaly.....TRACHINOIDÆ.

Ventrals separated by a wide area. Anal

moderate. Body naked.....BOVICHTHYOIDÆ.

II. Lower pectoral rays branched.

B. Head cavernous. Preoperculum abruptly bent inwards beneath the head. Ventrals thoracic.....SILLAGINOIDÆ.

BB. Head with bones not cavernous. Ventrals jugular or subjugular.

a. Snout not produced. Body scaly.

b. Lateral line submedian along tail.....LATILOIDÆ.\*

bb. Fins trachinoid. Lateral line interrupted, or

continuous on the tail.....NOTOTHENIOIDÆ.

aa. Snout spatuliform. Body naked.....CHÆNICHTHYOIDÆ.

The genus *Homalopomus* of Girard originated from a mistake of its author. Its species is a member of the Gadoid genus *Merluccius*, near which it was subsequently placed by its describer. A form that has been retained in the family of Latiloidæ, and which was first referred by Günther to the Trachinina, has nevertheless much resemblance to that genus.

The characters used in the above analytical synopsis, to distinguish the various supposed families, are coincident with others of importance; their combination produces or accompanies special modifications of form and difference of physiognomy, and those variations appear to be of family value. Such families appear to be of equal rank with those accepted by the most scientific of the modern therologists and ornithologists, and with those of the reptilian orders of Chelonians and Saurians as viewed by Agassiz, Gray and others. Their value also seems to be much greater than those of the families of Ophidians established by Dr. Günther, which have apparently very little title to such rank;\* it may be further remarked that some of the families recently

\* Mr. Cope, in his admirable series of memoirs on the Ophidians, is doing much to equalize the groups of that order, and assimilate the value of its families, subfamilies and genera to those of higher vertebrata. With many modifications, the families of Günther are more properly regarded as subfamilies.

instituted by Dr. Gray among the terrestrial pulmoniferous mollusks, appear to have also less right to rank as such. On some future occasion it is proposed to discuss more fully the meaning and limits of families among the fishes. It may perhaps not be uninteresting to here exhibit the views, regarding the present forms, of a naturalist who has been for many years investigating with a prodigious activity the whole class, who has described nearly an eighth of all the known species, inclusive of both recent and fossil ones, and who, by the admirable precision and clearness of his descriptions, surpasses any of his predecessors.

Dr. Bleeker has distributed members of the seven groups, above elevated to family rank, among five of his orders and seven different families. The most patent mode to show the wide differences of his views from those of Günther, will be to arrange them in the regular serial order adopted by himself. Two other groups are introduced which contain the remaining Trachinidæ of Günther. They are the Percoid subfamily of Mesopriodontiformes, with the genus *Latilus* and the family of Uranoscopidae.

Caterva 1. Katapiesecephali.

Ordo 24. Percæ.

Subordo 4. Percichthyini.

Sectio 1. Paristemipteri.

Tribus 2. Percichthyini.

Familia 76, (14.) Percoidæ.

Subfamilia 6. Mesopriodontiformes.

Gen. *LATILUS*, Cuv. (&c.)

Subfamilia 8. Trichodontiformes.

Gen. *TRICHOODON* Steller.

Sectio 2. Areiognathi.

Familia 84, (22.) Sciænoidei, = Sciænini, Bon.

Subfamilia 2. Sillaginiformes.

Gen. *SILLAGO*, Cuv. *SILLAGINICHTHYS*, Blkr. *Aspro*, Cuv.

Subfamilia 3. Sciæniformes.

Gen. *ELEGINUS*, Cuv. All others are true Sciænoids, except *Conodon*, which is a Pristipomatoid.

Ordo 26. Scombri.

Tribus 1. Sphyrænichthyini.

Familia 93, (1.) Sphyrænoidei, = Sphyrænidæ, Bon.

Gen. *Sphyræna*, Art. *Paralepis*, Risso. *PERCORHIS*, Cuv. (fort. tolid subfamilia,) &c. (extinct genera.)

Caterva 2. Platycephalichthyes.

Ordo 31. Uranoscopi = Uranoscopini, Bp.

Familia 114. Uranoscopidae.

Gen. *Uranoscopus*, Gron. *Ichthyoscopus*, Swns.

Ordo 33. Platycephali.

Familia 118, (2.) Callionymoidei = Callionymini, Bon.

Gen. *Callionymus* L. *Harpagifer* Richds. *CHÆNICHTHYS* Richds.

Caterva 3. Blennii.

Ordo 34. Cotti.

Familia 120, (2.) Cottoidei = Cottini, Bp. = Cottidæ, Sws.

Gen. *BOVICHTHYS*, Cuv., *Cottus*, L. and the typical Cottoids, but two genera repeated (*Aspidocottus*, Gir. = *Clyptocottus* "Gir." Ayres); *Hemilepidotus*, Cuv. = *Calycelepidotus*, Agr.)

Ordo 35. Blennii.

Familia 121, (1.) Trachinoidei.

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Gen. TRACHINUS Art., APHERITIS Cuv., PERCIS Klein, PINGUIPES Cuv., Malacanthus Cuv., Heterostichus Gir.

Familia 123, (3.) Blennoidei.

Subfamilia 4. Comephariformes.

Gen. Comephorus Lac., PAGETODES Richds., an huj loc.

There certainly is scarcely room for greater differences of opinion than those apparent in the respective arrangements by Günther and Bleeker of the above enumerated genera. The classification of the latter is so fundamentally different from any other, that it is impossible to equalize or parallel his groups above families with those of other ichthyologists. It can be only remarked that, among the Teleostean fishes of Müller, the orders are of less value than those generally accepted by ichthyologists, but, at the same time, all the osseous Ganoids are interposed between the genus *Amphisila* and the *Pectorales pediculus* of Cuvier, and the other Teleosteans. On further study, it is probable that Dr. Bleeker, with his usual candor, will be himself the first to modify some portions of his classification. Dr. Günther appears to be correct in approximating to each other many of the above mentioned forms and in separating them from others into which they had been referred, but wrong in collecting them in one family. Some of the allocations which Dr. Bleeker has made in this, as in many other instances, has doubtless resulted from confidence in the correctness of others. One such case is the retention of *Heterostichus* in the family of Trachinoidei, to which it had been referred by Dr. Girard. That genus is, however, very nearly related to *Myxodes* of Cuvier, and is consequently a Blennoid. In the monographic synopses of the various groups which it is proposed to publish, the relations of the families here noticed will be more fully discussed.

Dr. Günther himself, shortly after the publication of the second volume of "The Catalogue of the Acanthopterygian Fishes," modified his classification of the Trachinidæ by introducing an additional subfamily—"Nototheniina"—in which he included *Notothenia* and *Harpagifer*, previously placed in the group of Pseudochromides, and *Chanichthys* of the former one of Trachinina. The group so constituted was distinguished by its distinct dorsal fins and interrupted lateral line. The modification appears to be an improvement on the former arrangement, but the remarks previously made on the value of the characters of the several types, are equally applicable to the revised classification.

We now offer a synopsis of the respective groups which appear to us to be nearly related, and together to constitute a homogeneous and distinct family:—

Lateral line interrupted. Body regularly tapering.....	NOTOTHENINÆ.
Abdominal region shorter than head. Dorsal spines slender..	Notothenia.
Abdominal region longer than head. Dorsal spine short	
and stout.....	.....Macronotothen:
Lateral line continuous. Body subfusiform.....	ELEGININÆ.
Abdominal region shorter than head. First dorsal triangular.....	Eleginus.

The family thus formed appears to be a perfectly natural one, notwithstanding the difference of the lateral line. The lateral line of the genus *Eleginus* may be said to represent the anterior or superior one of *Notothenia*, continued in an uninterrupted course to the caudal fin. An inferior line runs along the middle of the side of the caudal peduncle in *Notothenia*, and is often visible a short distance in front of the termination of the higher one. The lateral line may be therefore said to be partly double. But as the presence of two parallel lateral lines is exceedingly uncommon in fishes, and the line of *Eleginus* is homologous to the upper one of *Notothenia* if projected backwards, the lower one consequently disappears in the former.



In other families, such as the Chromoids, Pomacentroids and Labroids, the lateral line is also generally interrupted, or it is sometimes obsolete behind, and sometimes the superior or anterior portion is deflected and joins the inferior and posterior one, thus forming a continuous line, but not pursuing an uninterrupted course. No instance is apparently known where the superior part is entirely developed at the expense of the inferior.

In other respects, the likeness of *Notothenia* and *Eleginus* is very apparent, and was commented on by Sir John Richardson; yet he, with too implicit reliance on Cuvier, retained the latter in the family of Sciænoids, while he referred the former to that of Gobioids on account of the flexibility of the dorsal spines of the typical species, and the resemblance to *Eleotris*. All of the essential characters of *Notothenia* and *Eleginus* appear, however, to be shared, the differences being indicative of much less than family rank. The general physiognomy, the essential structure of the fins and the anatomical features, as far as known, are similar. The system of muciferous pores is also entirely homologous; it is most apparent in *Eleginus*, and may be illustrated here.

The lateral line is continued forwards by pores nearly along the oculo-scapular groove, beneath the eyes and near the margin of the snout; again, along the margins of the preopercula and beneath the dentary bones. At the nape are generally three pores between those of the oculo-scapular grooves. Five others are arranged in a more or less regular quincunx in and behind the interorbital area: between each one, forming the anterior angle of the quincunx and the tubular nostril, is generally another. Supernumerary ones are frequently interposed between the preceding; more rarely all on the crown and forehead are rudimentary or obsolete, as in the genus *Maeronotothen*.

It remains to indicate the distinctions between the family and others. From the Sciænoids it is distinguished by the non-development of a cavernous skull, the increased number of vertebræ, the structure of the fins and the extent of the anal, the position of the ventral fins, the number of branchiostegal rays, the course of the lateral line, and the absence of scales on the fins. The physiognomy is also quite different.

It differs from that of the Gobioids by the form of the stomach and the presence of pancreatic cæca, the structure and extent of the vertical fins, the relation of the ventral ones, the presence of a lateral line and the structure of the scales.

It is more nearly allied to the Latiloidæ, the Harpagiferoidæ and the Chænichthyoidæ, but its physiognomy is unlike that of any of them. From the first, it is also distinguished by the structure of the fins, the course of the lateral line and perhaps the development of the muciferous pores. From the Harpagiferoids, by the scaly body and the unarmed head. From the Chænichthyoidæ, by the scaly body, as well as the form and structure of the head and the normal development of the snout.

It might, perhaps, be natural to unite the two last named forms in the same family with the present, but the different aspect of the respective groups joined to the positive characters distinguishing them, scarcely appear to warrant such a combination. The Harpagiferoids are in some respects the most closely allied. The Notothenioids seem to hold a position in the Southern seas analogous to that of the codfishes of the Northern ones.

#### Subfamily NOTOTHENINÆ (Gthr.) Gill.

##### *Synonymy.*

*Nototheniina*, part. (*Notothenia*) *Günther*, Annals and Magazine of Natural History.

*Notothenioidæ* corpore regulariter attenuata, lineâ laterali postice interrupta.

Body robust and anteriorly subcylindrical. Lateral line interrupted behind.  
1861.]

Head moderate, oblong, with the cheeks more or less tumid. Profile in front of eye, convex or slightly decurved. Eyes chiefly anterior. Mouth moderate and oblique. Spinous dorsal fin small and distinct from the soft one. The rays of the latter and of the anal are branched.

The subfamily of the *Nototheniinae* is at once recognized by the interrupted lateral line as well as by the form of its body. The first dorsal fin is generally composed of slender spines like those of the *Gobioids*, but in one genus the spines are robust, acute and short.

The representatives of the group are confined to the southern latitudes, and are principally inhabitants of the sea bounding the Falkland Islands and Kerguelen's Land.

#### Genus NOTOTHENIA Richardson.

##### *Synonymy.*

*Notothenia* Richardson, Ichthyology of the Erebus and Terror, p. 5.

" *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii., p. 260.

*Nototheniinae* corporis portione abdominale breve, capite brevior; pinna dorsali prima radiis 5—6, gracilibus et flexilibus; pinnis pectoralibus caudalique convexis.

Body robust, with a stout and short caudal peduncle, and with the preanal or abdominal region shorter than the head. Scales rather small and ciliated. Head more or less scaly, with the skin above soft and naked, or covered with scales. Pores of the nape, oculo-scapular grooves, preoperculum and inter-orbital regions developed. Posterior nostrils subtubular. Teeth of the jaws uniserial on the sides, at the symphysis generally pauciserial. First dorsal fin about as high as long, with its spines flexible, five to six in number. Anal fin commencing under or near the middle of the pectoral fins, and distant from the ventrals less than the head's length; the distance is less than half the length of the fin. Caudal fin convex behind. Pectoral fins large and also convex behind. Ventral fins with its third or fourth rays longest, or both subequal.

Type. *Notothenia coriiceps* Richardson.

The genus *Notothenia* is here really retained with the same limits as were assigned to it by Sir John Richardson, but that gentleman referred to it with doubt a species which has apparently very little affinity with the typical species, and which has been in this synopsis of the family accepted as the type of a distinct genus. The present contains fishes whose length varies from about five to fifteen inches. The species closely resemble each other in physiognomy and general appearance, but yet differ remarkably in the extent of the squamation of the head, there being every variation from almost entire nudity to nearly perfect investment of scales; the preopercular margin, the snout and region behind the supramaxillary bones, are, however, always naked. Although there is scarcely ever so great a variation in the distribution of the scales in one natural genus, I am quite unable to find any other characters which are coincident with the modifications of the squamation that have any pretensions to generic importance. As there is also a strict gradation between the extremes of nudity and squamation, it would appear that there can be little doubt of the generic identity of all the well known species.

There are, however, two forms which are imperfectly known, that manifest considerable variation from their congeners in the relative extent of the second dorsal and anal fins. In one the anal fin has several more rays than the dorsal, while in the typical *Notothenia* the number is either somewhat less or equal. In the second, the anal fin has only two-thirds as many rays as the soft dorsal. That modification appears to be also accompanied by the presence of a wider cranium. Whether those differences are indicative of other modifications of

structure has not been mentioned. They must, therefore, for the present at least, be retained in the same genus.

The following analytical synopsis is chiefly intended to show the gradations in the extension of the scales on the head:—

- I. Anal rays 25—33, not exceeding those of soft dorsal.
- Ia. Anal rays 27—33.
- A. Second dorsal with more rays than anal. Head naked above.
- a. Scales before or on sides of nuchal groove none.  
Operculum above *upper* rib scaly; scattered scales before *upper* angle of preoperculum.  
D. V. 31—33. A. 27—29.  
Broad lateral band and narrow dorsal band yellow..N. *virgata*.  
Bands none. Dorsal and anal uniform..... N. *cornucola*.  
Bands none. Dorsal and anal margined with lighter.....N. *marginata*.
- aa. Scales between nuchal and oculo-scapular grooves.
- b. Prenuchal scales in *one* oblique band on each side. Operculum above *superior* rib scaly.  
Scattered nearly uniserial scales below sub-orbitals. D. V. 35 A. 28. ....N. *coriiceps*.
- bb. Prenuchal scales in *two* patches on each side.  
Operculum above *inferior* rib with imbricated scales.
- c. Cheeks with *lower half* naked. D. IV. 35, A. 31..N. *purpuriceps*.
- cc. Cheeks *entirely* scaly. Preopercular margin naked as usual. D. V. 35, A. 31—33 .....N. *cyanobrancha*.
- AA. Second dorsal and anal nearly equiradiate. Head scaly above and between eyes. Operculum entirely covered with imbricated scales. Cheeks entirely scaly. (Naked along preopercular margin and behind maxillaries as in others.)
- b. Scales above irregular or scattered. D. VI. 28, A. 28.....N. *sima*.
- bb. Scales above imbricated. D. VI. 33—34, A. 33..N. *tessellata*.
- Iaa. Anal rays 25. D. V. 31.....N. *magellanicus*.
- II. Anal rays 30; dorsal only (IV.) 25.....N. *phocæ*.
- III. Anal rays only 21 (D. V. 30—31.).....N. *macrocephalus*.

1. NOTOTHENIA VIRGATA Richardson.

*Notothenia virgata* Richardson, Ichthyology of the Erebus and Terror, p. 18, pl. xi., figs. 5, 6.

*Habitat*.—Falkland Islands.

2. NOTOTHENIA CORNUCOLA Richardson.

*Notothenia cornucola* Richardson, Ichthyology of the Erebus and Terror, p. 8, pl. viii., figs. 4, 5; *ib.* p. 18, pl. xi., figs. 3, 4.

*Habitat*.—Falkland Islands.

This species is closely allied to *N. virgata*, and may be the same; it still more nearly resembles the following.

3. NOTOTHENIA MARGINATA Richardson.

*Notothenia marginata* Rich., Ichthyology of the Erebus and Terror, p. 18, pl. xii., figs. 1, 2.

*Habitat*.—Falkland Islands.

This may be identical with the former, and has been united to it by Dr. Günther; it differs by the paler margins of the dorsal and anal fins.

1861.]

4. *NOTOTHENIA CORIICEPS* Richardson.  
*Notothenia coriiceps* *Rich.*, Ichthyology of the Erebus and Terror, p. 5,  
 pl. iii., figs. 1, 2.  
*Habitat.*—Coasts of Kerguelen's Land and of the Auckland Islands.
5. *NOTOTHENIA PURPURICEPS* Richardson.  
*Notothenia purpuriceps* *Rich.*, Ichthyology of Erebus and Terror, p. 7, pl. ii.,  
 figs. 3, 4.  
*Habitat.*—Kerguelen's Land.
6. *NOTOTHENIA CYANOBRANCHA* Richardson.  
*Notothenia cyanobrancha* *Rich.*, Ichthyology of the Erebus and Terror, p.  
 7, pl. iv.  
*Habitat.*—Kerguelen's Land.
7. *NOTOTHENIA SIMA* Richardson.  
*Notothenia sima* *Rich.*, Ichthyology of the Erebus and Terror, pl. xi., figs.  
 1, 2.  
*Habitat.*—Falkland Islands.
8. *NOTOTHENIA TESSELLATA* Richardson.  
*Notothenia tessellata* *Rich.*, Ichthyology of the Erebus and Terror, p. 19,  
 pl. xii., figs. 2, 3.  
*Habitat.*—Falkland Islands.
9. *NOTOTHENIA MAGELLANICA* Richardson.  
*Gadus magellanicus* *Forster* apud *Bloch*, Systema Ichthyologiæ, *Schneid.*  
 ed., p. 11.  
*Notothenia magellanica* *Rich.*, Ichthyology of the Erebus and Terror, p. 9.  
*Lota magellanica* *Rich.*, op. cit., p. 61.  
*Habitat.*—In littoral sea-weed of Terra del Fuego.  
 Richardson, having apparently forgotten that he had seen a drawing of this  
 species and identified it as a *Notothenia*, afterwards referred to it as *Lota*.  
 This and the following two species are very imperfectly known.
10. *NOTOTHENIA PHOCÆ* Richardson.  
*Notothenia phocæ* *Rich.*, Ichthyology of the Erebus and Terror, p. 8.  
*Habitat.*—Antarctic Ocean (Lat. 65°, Long. 155° W. of Greenwich.)
11. *NOTOTHENIA MACROCEPHALUS* Günther.  
*Notothenia macrocephalus* *Günther*, Catalogue of the Acanthopterygian  
 Fishes, &c., vol. ii., p. 263.  
*Habitat.*—Falkland Islands.

## Genus MACRONOTOTHEN Gill.

*Synonymy.*

*Notothenia* ? sp. *Richardson*.

*Notothenia* sp. *Günther*.

*Nototheniina* corporis portiore abdominale elongato, capite longiore; pinna dorsali prima radiis 7, validis, acutis et brevibus; pinnis pectoralibus caudalique truncatis.

Body little robust, with a rather slender caudal peduncle, and with the preanal region longer than the head. Scales small and ciliated. Head with few scales, mostly naked, and above with the sculpture of the bones apparent. Pores scarcely developed. Posterior nostrils subtubular. Teeth of the jaws villiform, stouter and subulate in the outer row. First dorsal fin low, and sustained by about seven short and pungent spines. Anal fin distant more than the head's length from the ventrals, the distance being about equal to the length of the fin itself. Caudal fin moderate, and obliquely subtruncated behind. Ventral fins with the fourth ray longest.

Type. *Macronotothen Rossii Gill.*

The present is most nearly allied to the genus *Notothenia*, but is distinguished from it by many important characters, all those above enumerated being peculiar, with the exception of the size of the scales and the character of the nostrils, both of which are common to it and *Notothenia*. The most striking difference is the extent of the abdominal region, which entails a corresponding modification of the fins. One of the most positive technical characters is the brevity and pungency of the dorsal spines.

*Macronotothen* is at present represented by only one species, which attains to a length of about three feet. All of the species of *Notothenia* are comparatively small, the largest known not exceeding fifteen inches.

MACRONOTOTHEN ROSSII Gill.

*Notothenia*? Rossii Richardson, Ichthyology of the Erebus and Terror, p. 9, pl. ix., figs. 1, 2.

*Notothenia* Rossii Günther, Catalogue of the Acanthopterygian Fishes, &c., vol. ii., p. 263.

*Habitat.*—Unknown.

Subfamily ELEGINIINÆ Gill.

*Synonymy.*

Sciænidæ partim Cuvier, et auct. al.

Trachinina partim Günther.

*Notothenioidæ* corpore fusiforme, lineâ laterali ad pinuam caudalem extendente.

Form subfusiform in profile, highest under the first dorsal fin. Lateral line uninterrupted and continued to the caudal fin. Head moderate or small, with the profile in front of eyes convex or slightly decurved, and with the opercular region somewhat tumid. Eyes principally in the anterior half of the head. Mouth moderate and oblique. Spinous dorsal fin small and distinct from the soft. The rays of the latter fin, as well as of the anal are branched.

The Eleginiinæ are distinguished by the subfusiform body and by the continuation of the lateral line above to the caudal fin. Like *Nototheniinae*, they are inhabitants of the Southern seas; but representatives extend much farther towards the equator.

Genus ELEGINUS Cuvier.

*Synonymy.*

*Eleginus* Cuvier et Val., Histoire Naturelle des Poissons, tom. v., p. 158.

*Eleginus* Gay, Richardson, Günther.

Body rather slender, subfusiform in profile, highest above the abdomen, rather rapidly decreasing between the dorsal and anal fins, and with the caudal peduncle slender. Scales rather small, and minutely ciliated. Head scaly above and on the sides, but with the snout and preorbital region naked. Pores of the nape, oculo-scapular grooves and forehead well developed. Nostrils simple. Teeth of the jaws villiform and in a narrow band. First dorsal fin triangular, with eight or nine rapidly decreasing spines. Second dorsal and anal fins highest in front, and slightly incurved behind. Anal fin distant from the ventrals about a head's length, longer than that interval. Caudal fin emarginated. Pectoral fins pointed. Ventrals with the second or third ray longest.

Type. *Eleginus maclovinus* Cuv. et Val.

Three species of *Eleginus* have been described, and a fourth nominal one has been added by Sir John Richardson. The last is doubtless identical with the typical species of the genus, having been described from specimens taken at the same islands as those of which the *Eleginus maclovinus* is an inhabitant; and the remarks concerning its abundance and uses themselves strongly corroborate.]

roberate the identity of the two species. The *Eleginus bursinus* is very imperfectly known, no characteristic or distinctive character having been assigned to it by Cuvier and Valenciennes, their notice chiefly comparing it with the *E. maclovinus*.

The following synopsis indicates the principal differences between the species. Caudal emarginated. Angle of preoperculum obtusely angular.

- Greenish, with blackish margined scales..... *E. maclovinus*.  
 Brownish. Second dorsal spotted..... *E. bursinus*.  
 Caudal entire or convex. Angle of preoperculum nearly rectangular. Body one-sixth as high as long..... *E. chilensis*.

1. *ELEGINUS MACLOVINUS* Cuv. et Val.

*Atherina macloviana* Lesson, Voyage de la Coquille, Zoologie, vol. ii., p. 202, pl. 17.

*Eleginus maclovinus* Cuv. et Val., Hist. Nat. des Poissons, tome v., p. 158, pl. 115.

*Eleginus falklandicus* Richardson, Voyage of the Erebus and Terror, *Fishes*, p. 30, pl. 20, figs. 1—3.

*Habitat*.—Falkland Islands.

2. *ELEGINUS BURSINUS* Cuv. et Val.

*Eleginus bursinus* Cuv. et Val., Hist. Nat. des Poissons, tome v., p. 161.

*Habitat*.—Port Jackson, Australia.

3. *ELEGINUS CHILENSIS* Cuv. et Val.

*Eleginus chilensis* Cuv. et Val., Hist. Nat. des Poissons, tome ix., p. 480.

*Habitat*.—Chilian coast.

[NOTE.—After the preceding paper had been forwarded to the Academy, it was discovered that two species, (*Aphritis undulatus* and *A. porosus*,) referred by Jenyns to the genus *Aphritis*, not only are generically distinct, but belong to a different family, and form a genus nearly related to *Eleginus*, which will be at an early date described as *Eleginops*. *Aphritis* is apparently most nearly related to the genus *Percophis*.

The Committee to which was referred Dr. Slack's Handbook to the Museum of the Academy of Natural Sciences, recommended that it be published with the sanction of the Academy. The report was adopted and the Committee discharged.

On motion, permission was granted to Mr. E. D. Cope to state to the Academy a few observations which he had made upon certain Cyprinoid fish in Pennsylvania during the previous summer:

He had observed that the *Cyprinella analostana* of Girard—the only known eastern representative of the genus—found hitherto only in the Potomac—extended into the northern regions of the Susquehanna basin, having been discovered by him in Elk Lake, Susquehanna Co. It had since been found in the Delaware region, near Philadelphia, by Mr. J. Burke, who had placed specimens in the Academy's aquarium; and near Trenton, N. Jersey, by Mr. Abbott, the ichthyologist. The *Pliargyrus* of the Susquehanna, obtained from the Raystown Juniata, Bedford Co., the Meshoppen Creek, Susquehanna Co., and the Elk Creek, Chester Co., he believed to be a different species from that most common in the tributaries of the Delaware, which latter differs materially from the New England fish called by some *P. cornutus*. The *Leucosomi* appeared to be similarly distributed. That of the Susquehanna

is *L. cataractus* of Prof. Baird,\* an abundant fish, and one that takes the bait very eagerly. That inhabiting the Brandywine, the Rancocas and other tributaries of the Delaware, differed from this and from the New England species, *L. pulchellus*, Storer, in the greater size of its scales. The number which the lateral line traverses is 47; in *cataractus*, the same; in *pulchellus*, 59. Other specific peculiarities were presented in the following diagnostic form:—

Length of head entering into total length (including caudal fin), four and three-quarter times; greatest depth of body seven-eighths the length of the head, of which the diameter of the orbit occupies a little more than one-fifth. Length of the superior surface of the head a little less than one-third the distance between the extremity of the muzzle and the base of the dorsal fin, and twice the breadth between the orbits. The distance from the base of the caudal fin to the anterior border of that of the dorsal is nine-tenths the distance anterior to the latter point. Ventral fin opposite the dorsal; its anterior border shorter than that of the anal, which is similarly related to the dorsal in that respect. The muzzle projects slightly beyond the mandible. Mouth cleft obliquely downward, its rictus corresponding with a point marking three-fourths the distance from the end of the muzzle to the anterior rim of the orbit. Barbels quite small, even in large specimens. Membranous border of the operculum narrow; that at the bases of the scales slight. The exposed portions of the scales upon the sides are twice as high as wide, and nearly symmetrical; there are about twenty strong radii, and numerous weak concentric lines, which are strongest near the margin. Eight rows above the lateral line, five below; total fourteen; seven rows upon the caudal peduncle at its middle.

This species had been called *Semotilus corporalis* by Mr. Abbott, (Proceed. Acad. Nat. Sci., Phila., 1861, p. 154,) but Mr. Cope was of the opinion that *Cyprinus corporalis* of Mitchell was a different fish. He also dissented from the generic determination of the former author. He proposed, therefore, that it be known as *Leucosomus rhodus*. Mr. Abbott's radial formulæ were correct, but there were apparent inaccuracies in the description of color; without living specimens, a correction could not be made, but its general appearance when drawn from the water, as far as Mr. Cope recollected, was silvery, without spots or bands. Shortly after death the upper regions became of a light steel blue. Mr. Cope further stated that *Semotilus atromaculatus* of Mr. Abbott's article was also a *Leucosomus*. Specimens of another *Leucosomus* had been sent to the Academy from the Alleghany River.

He had found neither *Ceratichthys* nor *Exoglossum* in the Delaware streams, though they abounded in those of the Susquehanna.

Mr. Cope stated that he had made the interesting discovery of the occurrence of the genus *Chrosomus* Raf. in the Susquehanna basin. It had been previously known exclusively as a transalleghean type. The specimens of the species which he called *Chrosomus eos*, were caught in the Meshoppen creek, Susquehanna county. The peculiarities which first strike the eye as separating them from those of *C. erythrogaster*, are—1st, the absence of lateral line; 2d, the nearly straight dorsal outline; 3d, the want of prominence of the premaxillary region, and the downward slope of the mouth; 4th, the confinement on the tail of the lateral colored bands. A groove extends on each side of the body above the position corresponding to that of the rudimentary lateral line of *erythrogaster*; along this the superior lateral black stripe runs. The inferior band becoming confluent with the upper, traverses the median lateral line of the peduncle of the tail. The depth of the body anterior to the dorsal fin enters the length exclusive of the caudal fin, a little more than four times. Thus it is a more slender species than the *erythrogaster*. The

\* Iconogr. Encyclop. ii. p. 216.

diameter of the eye is greater than the distance from its anterior border to the end of the muzzle; it enters the length of the head  $3\frac{1}{2}$  times. The proportions of the fins are similar to those in *Erythrogastrer*, excepting in the absence of one ray in the anal, and two in the caudal. The formula is D. 8, C. 18, A. 8, V. 3, P. 16. Of the five larger pharyngeal teeth the smallest is much hooked. In specimens  $2\frac{1}{2}$  inches long taken in September, the abdomen was yellowish silvery as far as the inferior lateral line; above this the tint was brownish vitelline, darkest superiorly. No silvery between the bands.

In presenting to the Academy a specimen of *Phalotris tricolor* (*Elapomorphus tricolor* D. and B.) from Paraguay, Mr. Cope took occasion to state that in his opinion *Elapomorphus* as left in the *Erpetologie Générale* was a union of three generic forms, which he stated to be the following. First *Elapomorphus*, having four frontal plates; species, *E. blumii*, *E. affinis* Rhdt., *E. wuchereri* Gthr.; second *Phalotris*, in which the post-frontals are confluent,\* species, *P. tricolor*, *P. lemniscatus*, *P. reticulatus* Peters sp. and *P. bilineatus*; third, *Apostolepis*, in which the prefrontals are obliterated; species, *A. lepida* Rhdt. sp., *A. flavotortuata* and *A. orbignyi*. Prof. Reinhardt had subsequently, very properly in Mr. Cope's opinion, placed the *E. gabonensis* Dum. in his genus *Urobelus*, (the African type,) with the *Acanthias* of Kroyer.

The obtuse tail, and peculiar frontal plates of *Apostolepis*, were observed in the genus *Sympholis* Cope. But the latter differed widely in its equal, grooveless teeth, its loreal plate approaching the orbit, and its nasal confluent with the first superior labial. The tail was shorter and more obtuse, the body more massive, the gastrosteges narrower, one small preocular above the loreal, one or no postocular. The eye very small, the muzzle prominent, obtuse, and furnished with a large rostral shield. No traces of scale pores, or posterior extremities. Urosteges two-rowed. He thought this singular form bore some affinity to *Stenorhina*, and perhaps to *Conopsis*, Gthr., which he had not seen. *S. lippiens* had been sent from Guadalupe, Mexico, by Mr. I. I. Major, to the Smithsonian Institution. The following diagnostic notice was offered: five separate upper labials, all higher than long except the last; the first two in contact with the orbit. Third and fourth separated from occipital by one temporal. Each of the latter is a little longer than broad, and has its external anterior angle cut off by suture. The place of a superior postocular is occupied by a process of the superciliary; the inferior is on one side supplanted by the second superior labial. Superciliary plate as broad as the vertical; the latter is elongate hexagonal, the anterior and posterior angles equal and right. The frontals heptagonal, broad as long; rostral prominent, depressed, angular posteriorly. Scales higher than long, in nineteen rows. Tail scarcely twice as long as head, terminating in a convex shield. Anal plate entire. Total length 20 in. 9 lin., color yellow, with eighteen black bands on the body more or less incomplete inferiorly, two on the tail, and one covering the muzzle to behind the eyes.

The same locality and explorer had furnished the fifth species of *Coniophanes*, *C. lateritius*, which Mr. Cope exhibited to the members. The coloration was brilliant and at once characterized it. The whole body was bright vermilion punctulated with brown, passing through orange to golden on the belly. The head, and neck for ten scales posteriorly were black, the labials bordered and traversed by yellow lines, and the occipitals dotted with the same. Throat and chin yellow, black spotted. The head was broad posteriorly, and the outline converged rapidly to the acute prominent muzzle. Loreal square; one pre-, two postoculars. Seven upper labials, eye over third and fourth, fifth very large. Ten inferior labials. Scales in nineteen rows. Vertical plate nearly as broad as long. Anal divided. Total length 24 in. 3 lines, of this the tail is seven inches.

\* Vid. Pr. A. N. S. 1861, p. 302.



The following remarks by Dr. Stewardson, on the *Ailanthus* Silk Worm, are here introduced, having been accidentally omitted in their proper place :

At a meeting of the Academy, held March 5th, Dr. Stewardson called the attention of the members to the subject of the recent introduction of the *Ailanthus* Silk Worm into France, and its probable adaptation to our own country. Having been much interested in the short notices which he had met with in the French journals, he mentioned the subject to his friend, G. Roberts Smith, of this city, who kindly obtained for him from Paris a case containing specimens of this new silk worm (*Bombyx cynthia*), of its cocoon, and of the silk obtained from them, in the several states of crude silk, thread and woven cloth. These specimens were exhibited for the inspection of the members. In the month of June, through the kindness of the same gentleman, eggs of this *Bombyx* were received from Paris. The first lot entirely failed, most of the eggs having hatched before reaching their destination. From a second importation, which arrived a few days subsequently, Mr. Evans, an intelligent manufacturer in the neighborhood of Philadelphia, who warmly interested himself in Dr. Stewardson's views of introducing the cultivation of this silk in our country, succeeded in raising a few worms, which formed their cocoons in July. Towards the middle of August the butterflys made their appearance, and the eggs laid by them hatched their worms from the 30th of August to the 3d of September. A part of these worms were placed by Mr. Evans upon a copsis of *Ailanthus* in the neighborhood of his house. Another portion were placed by Dr. Stewardson upon a large *Ailanthus* tree in a private garden in Philadelphia. The remainder were fed by Dr. S. in a room at his own house. Those placed in the open air were exposed to violent rains and wind, but without injury. Nearly all those placed upon the tree in the city came to maturity and spun their cocoons, about eighty in number. Of those placed in the open air by Mr. Evans, many were destroyed by birds, but in other respects the success was perfect. About forty cocoons were obtained by Dr. S. from the worms raised at his house. A specimen of one of the latter, feeding upon the leaf of the *Ailanthus*, and on the eve of forming its cocoon, was exhibited to the members of the Academy, by Dr. Stewardson, at their meeting, held October 1st, at which time he gave a short history of his experiments and their results.

The *Ailanthus* Silk Worm, brought from China to Turin, in 1857, was introduced into France by M. Guérin-Méneville, in 1858, and already the results of its cultivation have been so encouraging, that but little doubt is now entertained that the production of this silk will soon become an extensive branch of industry in that country.

From a statement recently made to the French Academy, by M. Guérin-Méneville, it appears that the cocoons, which at first had to be carded, have been successfully unwound, but by what process he does not mention. This last discovery adds most materially to the value of this silk, and the ease with which the *Ailanthus* can be cultivated upon the poorest soils, together with the comparatively small amount of labor required in raising the worms, which, when a few days old, are placed upon hedges in the open air, and require scarcely any further attention, render this culture particularly worthy of attention in this country. The experiments of Dr. Stewardson convince him that our climate is well adapted to raising this worm, and that in this latitude two crops can be obtained in a season. Having succeeded in raising upwards of one hundred cocoons, he hopes, with the assistance of any gentlemen who may feel an interest in the subject, during the coming season, to continue the experiments upon this interesting subject on a more extensive scale.

The Reports of the Recording Secretary and Curators were read, as follows :

## REPORT OF THE RECORDING SECRETARY

FOR 1861.

During the year ending 30th November, 1861, there have been elected sixteen members and fifteen correspondents.

One member has resigned.

Eight members have died, to wit: Mr. John H. Markland, Dr. Charles Huffnagle, Dr. Samuel Moore, Dr. Richard Clements, Mr. Francis Peters, Mr. George M. Keim and Dr. George Spackman.

The death of the following correspondents has been announced: Prof. F. Tiedemann, of Heidelberg, and Dr. M. Grateloup, of Bordeaux.

During the same period the following papers have been read and ordered to be published in the Journal or Proceedings of the Academy:

By Charles C. Abbott, four, to wit: "Description of two new Species of *Pimelodus*, from Kansas." "Observations on *Cottus Copei*." "Notes on the Habits of *Aphredoderus Sayanus*." "On *Cyprinus Corporalis*, etc."

By Harrison Allen, M. D., two, to wit: "Description of new Pteropine Bats from Africa." "Description of a new Mexican Bat."

By W. G. Binney, two, to wit: "Catalogue of land and fresh-water Univalve Mollusks, etc." "Notes on the Terrestrial Mollusks of the Peninsular of California."

By A. D. Brown: "Description of two new Species of *Helix*."

By S. B. Buckley, two, to wit: "Notes on Ants in Texas." "Notes on the Bartram Oak."

By John Cassin: "Descriptions of new Birds from Western Africa, in the Museum of the Academy of Natural Sciences of Philadelphia," published in the Journal.

By E. D. Cope, four, to wit: "Catalogue of Colubridæ in the Museum of the Academy, etc., part 3." "Notes and descriptions of Anoles." "Contributions to the Ophiology of Lower California, Mexico and Central America." "On the Reptilia of Sombrero and Bermuda."

By Elliott Coues, three, to wit: "Monograph of Tringæ of North America." "Notes on the Ornithology of Labrador." "Monograph of the Genus *Ægiothus*, etc."

By Wm. H. Edwards: "Descriptions of certain Species of Diurnal Lepidoptera."

By D. G. Elliott: "Description of a new species of *Pitta*."

By Wm. M. Gabb, six, to wit: "Description of some new Species of Tertiary Fossils from Chiriqui." "Synopsis of American Cretaceous Brachiopoda." "List of the Mollusca inhabiting the neighborhood of Philadelphia." "Descriptions of new Species of Cretaceous Fossils from New Jersey, Alabama and Mississippi." "Descriptions of new Species of American Tertiary Fossils, etc." "Notes on Cretaceous Fossils, etc."

By Wm. M. Gabb and George H. Horn: "Monograph of the Fossil Polyzoa of the Secondary and Tertiary Formations of North America," published in the Journal.

By Theodore Gill, seventeen, to wit: "Description of a new Species of the Genus *Anableps*." "On the Classification of the *Eventognathi*." "Appendix to the Monograph of the *Phylipni*, etc." "Synopsis of the Subfamily of *Clupeinæ*, etc." "Synopsis of the Subfamily of *Percinæ*." "Synopsis Generum *Rhyptici et Affinium*." "Revision of the Genera of *Sciæninæ* of North Ame-

[Dec.

rica." "On the identity of the Genera *Neomœnis* of Girard and *Lutjanus* of Block." "On the *Haplodonotinae*." "On the Genus *Aristotremus*." "Synopsis of the *Uranoscopoids*." "Notes on some Genera of Fishes of the Western Coast of North America." "On a new type of *Aulostomatoids*, etc." "On the Genus *Podothecus*." "Description of a new Generic Type of *Blennoids*." "Monograph of the *Tridigitate Uranoscopoids*." "Synopsis of the *Polynematoids*." "Catalogue of the Marine Fishes of the Eastern Coast of North America, etc."

By George H. Horn: "Descriptions of new North American Coleoptera."

By Robert Kennicott: "On three new forms of Rattlesnakes."

By Isaac Lea, nine, to wit: "Description of twenty-five new Species of *Unionidæ*, from Georgia, Alabama, Mississippi and Florida." "Description of a new Species of *Neritina*, etc." "Description of two new Species of *Anodonta*, etc." "Description of new Species of *Anodonta* and *Lithasia*." "Descriptions of twelve new Species of *Uniones* from Alabama." "Description of a new genus (*Strephobasis*,) etc." "Description of forty-nine new Species of the Genus *Melania*." "Description of new Fossil Mollusca from the Cretaceous formation of Haddonfield, N. J." "New *Unionidæ* of the United States," published in the Journal.

By John L. LeConte, M. D., two, to wit: "New Species of Coleoptera inhabiting the Pacific District of the United States." "Notes on the Coleopterous Fauna of lower California."

By F. W. Lewis, M. D.: "Notes on new and rare Species of *Diatomaceæ* of the United States Seaboard."

By F. B. Meek: "Descriptions of new Cretaceous Fossils, etc."

By F. B. Meek and A. H. Worthen: "Descriptions of new Palæozoic Fossils, etc."

By Thaddeus Norris: "Description of a new Species of *Osmeus*, etc."

By Baron R. Osten Sacken: "Nine new North American *Limnotiaceæ*."

By Temple Prime, two, to wit: "Synonymy of the *Cyclades*, etc." "Descriptions of new Species of *Cyrena*, *Corbicula* and *Sphærium*."

By Edmund Ravenel, M. D.: "Descriptions of new recent Shells from the Coast of South Carolina."

By J. H. Slack, M. D.: "Description of a new Species of Rodent of the Genus *Spermophilus*."

By William Stimpson, two, to wit: "On the Marine Shells brought from Hudson's Bay by Wm. Drexler, etc." "Notes on certain *Decapod Crustacea*."

By George Suckley, M. D., U. S. A.: "Description of a new Species of North American Grouse."

By Philip R. Uhler, three, to wit: "Rectification of the Paper upon Hemiptera of the North Pacific Exploring Expedition." "Hemiptera of the North Pacific Exploring Expedition, etc." "Descriptions of four new Species of Hemiptera, etc."

By H. C. Wood, Jr, three, to wit: "Descriptions of new Species of *Scolopendra*, etc." "On the American *Chilopoda*, etc," published in the Journal. "Description of a new Species of the Genus *Thelyphonus*."

By John Xantus: "Description of three new Species of Star-fishes."

In all 77 papers.

During the same period the By-Laws have been amended as follows:

Article VIII. Chapter X. Add the words "of more than twenty of those extra copies." Adopted 31st December, 1860.

Article II. Chapter II. Lines first and second, to read thus: "No person residing in Philadelphia, or within a circuit of thirty miles, unless he be an Officer of the Army or Navy, can be chosen a Correspondent."

Article II. Chapter III. Introduce instead of the word "City," the words "aforesaid District and a Circuit of thirty miles around it;" and adding to the close of said article, "But this should not be construed with an exemption 1861.]

from payment of the regular dues on the part of those who, at the time of their election or afterwards, may have their permanent residence outside of said Circuit" Adopted 26th March.

All of which is respectfully submitted,

B. HOWARD RAND, M. D.,

*Recording Secretary.*

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## REPORT OF THE CURATORS FOR 1861.

Notwithstanding the unsettled condition of affairs of the country which absorbs so much the attention of our members as well as of all other citizens, the Museum of the Academy, during the year about closing, has presented about as much prosperity as in preceding years.

The collections generally continue in a good state of preservation, and none of the more perishable objects have suffered injury, except the entomological cabinet. In this department the orthoptera, which appear to have attracted little attention either for study or preservation, have been nearly destroyed. The other orders have been slightly damaged, but the Curators will shortly take steps to prevent further injury. The extensive herbarium and ornithological cabinet, as well as the collections of mammals, reptiles, fishes and crustacea, are in excellent condition.

A greater number of persons have visited the Museum this year than at any previous time. This, though gratifying as indicative of an increasing interest in our Institution, is attended with a result which requires some remedy. The movements of crowds of visitors give rise to clouds of dust which penetrates the cases and obscures the specimens. In default of means to render the cases impervious to dust, a person should be employed to cleanse the specimens.

The limited space occupied by the Academy is fast becoming inconveniently crowded by its collections, and it is to be regretted that we have no provision for a further extension of our space. Certain collections receive no accommodation whatever; as, for instance, a series of rocks or geological specimens. The last resource of the Curators to accommodate large objects is to mount them in the air above the cases occupying the floor, as has been recently done with the skeleton of a whale. For want of room, the Curators are almost constantly obliged to use the library, in the unpacking and packing of boxes. It is greatly to be hoped that an opportunity may arise which will give us the means of amplifying our space for the accommodation of our rapidly increasing museum and library.

The most important contributions to the Cabinet of the Academy during the year, are as follows:

1. The skeleton of a whale 30 feet in length, presented by George Davidson. It was mounted by James A. Wood, and now forms one of the most conspicuous objects of the Museum. The whale was captured last summer in the Delaware river, opposite Philadelphia.
2. A collection of 2500 specimens of marine animals, obtained last summer on the coast of Maine. Presented by Dr. J. H. Slack.
3. A large collection of marine animals from New Providence, Bahamas. Presented by H. C. Wood, Jr.

Besides the preceding, in addition to many objects received in exchange and on deposit, the following have been presented in the various departments of the Cabinet:

*Mammals.*—Eighty-six specimens of 30 species of rodents, bats, and carnivora, were presented by Dr. J. L. LeConte; the Smithsonian Institution presented 29

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specimens of 18 species of rodents and ruminants; 18 specimens of 14 species, chiefly quadrumana, were presented by Dr. J. H. Slack; 18 specimens, 8 species of Texas animals were presented by Dr. A. L. Heermann; and 11 others were presented by Van Amberg's Menagerie Co., Dr. J. M. Corse, S. B. Buckley, Geo. Davidson, J. R. Campbell, J. Krider, and Dr. J. Bryan.

*Birds.*—Ninety-nine specimens of 57 species of Western African birds, collected by Du Chaillu, were presented by Messrs. T. B. Wilson, S. and J. Jeanes, I. Lea, F. Rogers, C. E. Smith, A. H. Smith, J. Leidy, W. P. Foulke, E. Harris, W. S. Vaux, J. D. Logan, G. A. McCall, J. C. Trautwine, E. Durand, W. M. Uhler, S. W. Mitchell and J. L. LeConte. Thirty-nine specimens of 37 species, principally American birds, were presented by Dr. J. C. Letterman, T. Sitgreave, Dr. W. Gibson, Dr. A. L. Heermann, J. Jeanes, J. H. Slack, G. Davidson, J. H. Powel, C. J. and W. S. Wood, Mr. Orthwein, Dr. A. J. Foard, A. C. Thomas, and J. Rodgers. Dr. Slack presented 62 eggs, 27 species, from Minnesota; C. S. Westcott, 15 species eggs and 5 nests; Mr. Gabb, the egg of a Rhea; and Alfred Newton the nest and eggs of the Waxwing, *Ampelis garrulus*.

*Reptiles.*—Seventy-one specimens, 20 species of Texas reptiles, were presented by Dr. A. L. Heermann; and 19 specimens, of 16 species, were presented by Geo. Davidson, H. C. Wood, Dr. A. Wilson, E. C. Mitchell, E. D. Cope, M. Canby, and W. J. Chaloner.

*Fishes.*—The Smithsonian Institution presented 175 species, chiefly of American fishes. Mr. S. Powel presented 20 species, Dr. W. Gibson 16, Dr. Ruschenberger 17, and 10 others were derived from Capt. J. M. Dow, H. C. Wood, T. Norris, W. M. Gabb, J. T. Darby and Mr. Vanderslice.

*Mollusks.*—Lieut. T. T. Field presented a fine collection of shells from the Bay of Panama and other places; G. W. Tryon, Jr., presented 80 species of *Helix*; S. S. Haldeman 8 species *Ancylus*; and 70 species of shells were presented by G. Lincecum, T. Prime, G. W. Tryon, Jr., Dr. Ruschenberger, T. Bland, W. G. Binney, J. L. Mackey, Dr. Showalter, A. L. Heermann and M. Miles.

*Articulates.*—The Smithsonian Institution presented 55 species of crustacea, Geo. Davidson 12 species; and others were presented by Capt. J. M. Dow, J. Starr, Dr. Jos. Wilson, J. T. Darby and C. S. Westcott.

Of insects, Dr. A. L. Heermann presented a collection from Texas; and several specimens were obtained from Lieut. Field and A. Wilson. There were also presented several spiders, scorpions, and myriapods by Lieut. Field, H. C. Wood, J. T. Darby.

*Radiates.*—The Smithsonian Institution presented 35 species of corals, types described by Dana. Thirty-six echinoderms of 25 species were presented by Dr. W. F. Atlee, Capt. J. M. Dow, S. Powel, Dr. W. Gibson, Lieut. T. Y. Field, Dr. Ruschenberger, and Dr. F. W. Lewis. Four other radiates were presented by M. Newkirk, Dr. Cleburne and S. Powel.

*Anatomy.*—Dr. Jonathan C. Letterman, U. S. A., presented two skeletons of the camel, 1 of the Rocky Mountain sheep, and the skull of a grizzly bear. Dr. Heermann presented 8 skulls of mammals, Geo. Davidson 4, Mr. Krider 1, and Dr. D. P. Heap an ancient Roman skull. Miscellaneous specimens were presented by R. G. Curtin, Capt. Dupont, Dr. Cleburne, C. E. K. Kortright, R. E. Griffith, C. P. Eakin, Geo. Davidson and Dr. F. G. Smith.

*Fossils.*—An interesting collection of mosasaurus remains from New Jersey, were presented by Dr. J. H. Slack, J. Hopper, O. C. Herbert and U. Smock. Some cretaceous crocodylian and shark remains were presented by W. W. Lamb, a collection of miocene shark teeth by H. C. Yarrow, a miocene cetacean vertebra by T. J. Yarrow, Jr., M. D., a fine *Carcharodon megalodon* tooth by Dr. J. M. Corse, and a few other vertebrate remains by Rev. W. A. Breed, H. C. Yarrow, Abbott and Slack. S. S. Lyon presented 20 fine species of carboniferous fossils from Kentucky, Dr. Slack 98 species from the Isle of Man; and Dr. W. C. Dixon presented 8 species of coal plants from Virginia. Dr. W.

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Spillman presented a collection of eocene shells from Mississippi; and a number of other fossils were received from Ellwood Morris, A. L. Gerhart, C. C. Abbott, H. C. Wood, H. C. Yarrow, G. Lincecum, A. L. Heermann, W. M. Gabb, S. Ashmead and the Smithsonian Institution.

*Minerals.*—The British Consul, C. E. K. Kortright presented a fragment of a meteorite from India. A few minerals were presented by Dr. F. A. Genth, T. Y. Field, J. H. Slack, W. Cleburne, Gillette & Matthews, Mr. Struthers, E. L. Perkins, J. D. Sergeant, G. W. Farquhar, J. C. Fisher and W. W. Wright.

*Botany.*—Mr. Gideon Lincecum presented a collection of Texas plants comprising about 1000 species, S. B. Buckley a collection of Australian plants, Dr. J. L. LeConte a small collection from the herbarium of his father, the late Maj. LeConte, and Dr. I. I. Hayes a collection of living Arctic plants obtained in his late expedition.

*Miscellaneous.*—Mr. E. Samuels presented 33 mounted microscopic specimens, chiefly diatoms; F. W. Lewis 93 specimens, chiefly minute injections, sections of bones and teeth, &c.; and S. Powel 52 specimens. Mr. Pennock presented specimens of cannel coal and a variety of its products; and several rocks, &c. were presented by J. T. Piggott, G. Lincecum, Burke and Slack, and O. N. Rood.

Submitted by

JOSEPH LEIDY,

*Chairman of the Curators.*

The election of officers for the ensuing year was held, in accordance with the By-Laws, with the following result:

<i>President</i> ,.....	ISAAC LEA, LL. D.
<i>Vice Presidents</i> ,.....	Robert Bridges, M. D., Wm. S. Vaux.
<i>Corresponding Secretary</i> ,.....	Thomas Stewardson, M. D.
<i>Recording Secretary</i> ,.....	B. Howard Rand, M. D.
<i>Librarian</i> ,.....	R. E. Griffith.
<i>Treasurer</i> ,.....	Wm. C. Henzey.
<i>Curators</i> ,.....	Joseph Leidy, M. D., Wm. S. Vaux, John Cassin, J. D. Sergeant.
<i>Auditors</i> ,.....	Wm. S. Vaux, Joseph Jeanes, Aubrey H. Smith.
<i>Publication Committee</i> ,.....	Wm. S. Vaux, Isaac Lea, Robert Bridges, Joseph Leidy, Thomas Stewardson.

## ELECTIONS IN 1861.

The following persons were elected members :

*Jan.* 29. Joseph S. Lewis, Isaac Norris, M. D., Wm. H. Ashhurst.

*Feb.* 26. Wm. M. Canby, Thos. K. Conrad, George M. Conarroe.

*March* 26. Charles Schaffer, M. D., Wm. Bucknell.

*April* 30. John Rice.

*July* 30. Edward D. Cope.

*Nov.* 26. H. H. Furness, A. D. Brown.

The following persons were elected Correspondents :

*Jan.* 29. M. F. E. Guerin-Méneville, Paris.

*Feb.* 26. E. R. Showalter, Uniontown, Alabama ; M. J. C. Cornay, Paris ; A. W. Chapman, M. D., Apalachicola, Florida.

*March* 26. D. B. McCartee, Ningpo, China.

*April* 30. James Lewis, M. D., Mohawk, N. Y. ; Alfred Newton, London.

*May* 28. W. H. Edwards, New York ; James Wynne, M. D., New York ; George Thurber, New York.

*June* 25. Bernard R. Ross, Hudson's Bay ; John M. Woodworth, Chicago.

*Aug.* 27. Elliott Coues, Washington, D. C.

*Oct.* 29. Edgar Cowan, Greensburg, Westmoreland Co., Penna.

*Dec.* 31. Benj. D. Walsh, Rock Island, Illinois.

## CORRESPONDENCE OF THE ACADEMY FOR 1861.

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Letters were received and read as follows, viz.:

*Jan. 8th.* Wm. Spillman, Mobile, Nov. 30th, 1860; accompanying donation to Museum.

J. D. Graham, Chicago, Dec. 17th, 1860; proposing to publish names of societies, &c., to which the Journal and Proceedings of the Academy are sent;

Bergen's Museum, Norway, July 7th, 1860;

Royal Saxon Society of Sciences, Leipsig, May 1st, 1860;

Natural History Society, Basle, Switzerland, March 18th, 1860;

Geological Society, London, Nov. 17th, 1860;

Royal Academy of Sciences, Amsterdam, March 24th, 1860;

Royal Bavarian Academy of Sciences, Munich, Jan. 12th, 1860;

Society of Natural Sciences, of the Grand Duchy of Nassau, Nov. 3d, 1860; severally acknowledging the receipt of the publications of the Academy..

Royal Academy of Sciences, Amsterdam, Aug. 15th, 1860; accompanying donation to the Library.

*15th.* Society of Natural Sciences, Riga, April 28th, 1860;

Society of Natural Sciences, Wurttemberg, Sept. 1st, 1860; severally acknowledging the receipt of the Proceedings, and accompanying donations to the Library.

*Feb. 5th.* Royal University Library, Gottingen, Nov., 1860;

Imperial Leopold-Carolus Academy of Natural History, Jena, Sept. 7th, 1859;

Natural History Society, Dantzic, Oct. 10th, 1860;

New York State Library, Jan. 28th, 1861;

Society of Arts and Sciences, Utrecht, Sept., 1860;

Royal Jablonowski Society, Leipsig, Aug. 2d, 1860;

Batavian Society of Sciences, Rotterdam, Jan. 12th, 1860; severally acknowledging the receipt of the publications of the Academy.

Theodore Gill, Washington, Jan. 14th, 1861;

F. Roemer, Breslau, Prussia, Dec. 20th, 1860;

Jules Marcou, Boston, Feb. 4th, 1861;

John Warner, Bridgewater, Bucks Co., Penn., Jan. 26th, 1861; severally acknowledging their election as correspondents.

*12th.* Dr. Krauss, Stuttgart, Nov. 29th, 1860; acknowledging his election as correspondent.

*March 5th.* Lyceum of Natural History, New York, Feb. 25th, 1861; acknowledging the receipt of the publications of the Academy.

*12th.* Imperial Academy of Sciences, Vienna, Oct. 10th, 1860;

Senkenberg Society of Natural Sciences, Frankford on the Main, Oct. 9th, 1860; severally accompanying donations to the Library;

Royal Prussian Academy of Sciences, Berlin, Oct. 18th, 1860; accompanying donation to the Library, and acknowledging the receipt of the publications of the Academy;

Physico-Medical Society, Würzburg, Nov. 5th, 1860; of the same tenor;

E. R. Showalter, M. D., Uniontown, Alabama, March 5th, 1861; acknowledging his election as correspondent.

*April 2d.* J. du Mesnil Marigny, Paris, March 4th, 1861; accompanying donation to the Library;



Imperial Institute of France, Paris, Nov. 23d, 1860 ;  
 Royal Geographical Society, London, Jan. 10th, 1861 ;  
 Society of Agriculture, Science, &c., of Indre et Loire, Tours, Sept. 30th,  
 1860 ;  
 Natural History and Philosoph. Society, Belfast, Dec. 31st, 1860 ;  
 Bergen's Museum, Norway, Nov. 13th, 1860 ;  
 Society of Natural Sciences, Basle, Switzerland, Nov. 15th, 1860 ;  
 Royal Asiatic Society, London.

9th. British Museum, March 21st, 1861 ; severally acknowledging the receipt of the publication of the Academy.

16th. J. Henry, Smithsonian, accompanying a catalogue of duplicates from the Munich Library, from which the Academy is invited to select.

23d. Royal Society, Edinburgh, Jan. 18th, 1861 ; acknowledging the receipt of the Proceedings ;

J. C. Cornay, Paris, April 2d, 1861 ; acknowledging his election as correspondent.

May 7th. Royal Society of Sciences, Liège, July 12th, 1860 ;  
 Royal Danish Society of Sciences, Copenhagen, Jan. 1st, 1860 ;  
 Literary and Philosoph. Society, Liverpool, March 5th, 1861 ; severally acknowledging the receipt of the publications of the Academy.

Natural History Society, Augsburg, Dec. 20th, 1860 ;  
 Society of Natural Sciences, Lausanne, Nov. 10th, 1860 ;  
 Academy of Sciences of the Institute of Bologna, Sept. 4th, 1860 ;  
 Society of Physics and Natural History, Geneva, Nov. 1st, 1860 ;  
 Royal Physico-Economical Society, Königsburg, Nov. 13th, 1860 ; severally accompanying donations to the Library and acknowledging the receipt of the publications of the Academy.

Physico-Medical Society, Würzburg, Jan. 23d, 1861 ;  
 Royal Danish Society of Sciences, June 1st, 1860 ;  
 Imperial Academy of Sciences, Vienna, Dec. 28th, 1860 ;  
 Royal Society of Sciences, Liège, July 12th, 1860 ; severally accompanying donations to the Library.

Royal Academy of Sciences, Stockholm, Nov. 18th, 1860 ;  
 Royal Institution, London, Oct. 4th, 1860 ; severally accompanying donations to the Library and requesting exchanges ;  
 Imperial Academy of Sciences, Vienna, Nov. 3d, 1860 ; acknowledging the receipt of the publications of the Academy and requesting exchanges ;  
 Society of Natural Sciences, Bamberg, Dec. 15th, 1860 ; requesting exchanges.

14th. Smithsonian Institution, May 3d, 1861 ;

Prof. C. G. Forshcy, Rutersville, Texas, March 17th, 1861 ;

June 4th. Smithsonian Institution, May 16th, 1861 ; severally accompanying donations.

J. Lewis, Mohawk, New York, May 6th, 1861 ;

W. H. Edwards, New York, severally acknowledging their election as correspondents ;

Royal Academy of Sciences, Madrid, March 30th, 1861 ;

Asiatic Society, Calcutta, Dec. 6th, 1860 ; severally acknowledging the receipt of the publications of the Academy.

11th. Wm. Prescott, Concord, New Hampshire, May 23d, 1861 ; accompanying a donation.

July 2d. Geological Society, London, March 6th, 1861 ;

Lyceum of Natural History, New York, May 4th, 1861.

23d. Royal State Library, Munich, Dec. 20th, 1860 ;

Natural History Society of the Grand Duchy of Nassau, Wiesbaden, May 3d, 1861 ;

- Royal Imperial Geological Institution, Vienna, Nov. 20th, 1860;  
 London Athenæum, June 11th, 1861; severally acknowledging the receipt of the publications of the Academy;  
 Professor Henry, Smithsonian Institution, July 9th, 1861; accompanying list of duplicates from the Royal Library, Munich;  
 Royal Society of Sciences, Göttingen, Oct. 20th, 1860;  
 Library of the Royal Bavarian Academy of Sciences, Munich, Dec. 20th, 1860;  
 Royal Society, London, March 12th, 1861; severally accompanying donations to the Library and acknowledging the receipt of the publications of the Academy.  
 Direction of the Werner Societies, Brünn, April 15th, and Feb. 15th;  
 Imperial Academy of Sciences, Vienna, Feb. 26th and April 16th, 1861;  
 Natural History Society of the Grand Duchy of Nassau, Wiesbaden, May 3d, 1861;  
 Royal Prussian Academy of Sciences, Feb. 28th, 1861;  
 Natural History Society of Prussian Rhineland and Westphalia, Bonn, Jan. 21st, 1861;  
 Gustavus Gräbner, Leipzig, March 28th, 1861;  
 Professor Kirschbaum, Wiesbaden, May 3d, 1861; severally accompanying donations to the Library.
- Aug. 6th.* George Thurber, M. D., Michigan, July 22d, 1861; acknowledging his election as correspondent.
- 13th.* Botanical Society of Canada, Kingston, Aug. 9th, 1861; accompanying a donation to the Library and requesting exchange.
- 20th.* Biological Society, Paris, Dec. 15th, 1860; accompanying donation to the Library.  
 Geological Survey of India, Calcutta, Oct. 5th, accompanying a donation to the Library and acknowledging the receipt of the publications of the Academy.
- Sept. 3d.* Alfred Newton, Cambridge, England, May 21st, 1861; acknowledging his election as correspondent.
- 17th.* Linnean Society, London, July 1st, 1861;
- Oct. 1st.* Royal Society, London, July 1st, 1861; severally acknowledging the receipt of the publications of the Academy.  
 Royal Asiatic Society, London, June 29th, 1861; accompanying a donation to the Library, acknowledging the receipt of the publication of the Academy and offering exchanges.  
 Royal Horticultural Society, South Kensington, W., Sept. 13th, 1861; accompanying a donation to the Library, and agreeing to exchange, as well as acknowledging the receipt of the publications of the Academy.
- J. M. Woodworth, Chicago, Sept. 24th, 1861; acknowledging his election as correspondent.
- Oct. 8th.* New York State Library, Oct. 3d, 1861; acknowledging the receipt of the publications of the Academy.  
 C. E. K. Kortright, British Consul at Philadelphia, Oct. 7th, 1861; accompanying a donation to the Museum.
- Nov. 5th.* A. Daubrèe, Strasbourg, Feb. 8th, 1861; accompanying a donation to the Library.  
 Imperial Institute of France, Sept. 28th, 1861;  
 Literary and Philosoph. Society, Manchester, Aug. 31st, 1861;
- 12th.* Batavian Society of Sciences, Rotterdam, Dec. 29th, 1860;  
 Natural History Society in Emden, Feb. 4th, 1861;  
 Imperial Leopold-Carolus Academy of Naturalists, Jena, Nov. 6th, 1860;  
 Imperial Society of Naturalists, Moscow, Jan. 4th, 1861;

Academy of Sciences, Inscript. and Belles Letters, Toulouse, May 22d, 1860;

Zoologico-Botanical Society, Vienna, Dec. 5th, 1860;

Smithsonian Institution, June 25th, and Nov. 15th, 1860;—Jan. 18th, May 7th, 8th and 10th, 1861;

Entomological Monthly Bulletin, Vienna, Nov. 8th, 1861;

19th. Society of Naturalists, Zurich, July 17th, 1861; severally acknowledging the receipt of the publications of the Academy.

Society of Naturalists, Zurich, July 17th, 1861;

Society of Naturalists, Dorpat, April 13th, 1861; severally accompanying donations to the Library.

Dec. 3d. Literary and Philosoph. Society, Liverpool, Oct. 8th, 1861;

10th. Geological Society, London, Nov. 30th, 1861; severally acknowledging the receipt of the publications of the Academy.

Horticultural Society, London, Sept. 13th, 1861; accompanying a donation to the Library and requesting exchange.

## DONATIONS TO MUSEUM.

1861.

Atlee, W. F., M. D. *Jan.* 8th. 6 specimens, 3 genera, Echinidæ. W. Indies.

Abbott, C. C. *Feb.* 5th. Fossil shells, foraminifera, teeth, &c. Mullica Hill, N. J. *July* 2d. A fine specimen of *Alveolites glomeratus*, Say. N. Jersey.

Ashmead, Samuel. *July* 2d. 3 casts of shells from the post-pliocene formation on the east coast of New Jersey.

Bland, Thos. *July* 2d. *Anodonta moricandii*. Brazil. *Schizostoma Spillmanii*.

Binney, Wm. G. *July* 2d. *Helix cumberlandiana*. *July* 23d. A collection of 20 species European land and fresh water shells, 25 American *Cycladidæ*, 33 American land shells, and a series of New England marine deep water shells. Received in exchange.

Bryan, Jas., M. D. *July* 2d. A mounted specimen of *Cynocephalus porcarius*.

Buckley, S. B. *Oct.* 1st. *Spermophilus Buckleyii*. Texas. *Nov.* 12th. A collection of Australian Plants.

Breed, Rev. W. A. *Nov.* 12th. Teeth of *Carcharodon* and *Lamna*. Monmouth Co., N. J.

Burk and Slack. *Dec.* 24th. Frame and Picture of the Whale.

Campbell, J. R. *Jan.* 22d. *Hapale penicillatus*, (black headed Marmosette.) Brazil.

Curtin, R. G. *Feb.* 5th. Skeleton of *Lepus sylvaticus*. Pennsylvania.

Cleburne. *Feb.* 5th. Tooth of *Elephas Indicus*. *May* 7th. Obsidian and two species *Gorgonia*.

Corse, Jas. M., M. D. *Jan.* 8th. 3 specimens *Sciurus hudsonius*. *April* 2d. *Carcharodon megalodon*, tooth fished up in the Delaware below Bombay Hook.

Canby, M. *April* 2d. Large Gallapagos Tortoise.

Cope, Edward D. *June* 4th. *Amblystoma Jeffersonianum*. Pennsylvania.

Dow, John M. *Jan.* 8th. 8 specimens Fishes, 3 species. Guatemala.

Dixon, W. C., M. D. *Jan.* 8th. A collection of Coal Plants, 8 species, from Ohio Co., Virginia.

Dupont, Capt. F. *March* 5th. Head of *Oryx gazella* and *Damalis pygarga*, from Western Africa.

- Darby, J. T. *May* 7th. Crawfish, from Mammoth Cave, Ky. Scorpion and Flying Fish.
- Durand, E. *July* 9th. Camaroptera caniceps. (Du Chaillu Coll.) Western Africa.
- Davidson, George. *March* 5th. Felis concolor. California. *March* 12th. Eight specimens of Birds, from Ross Mountain, Cal. Skin of Bassaris astuta. California. *May* 7th. Numerous specimens, 12 species Crustacea, Gerhosaurus, Sceloporus, Amblystoma tenebrosus and Notophthalmus torosus. California. *May* 14th. Plate of Whalebone from whale recently caught in the Delaware. *July* 2d. Skeleton of the Whale recently caught in the Delaware River.
- Eakin, C. P. *April* 2. Cephalopod and Head of a Fish from Florida.
- Foulke, W. Parker. *Jan.* 1st. Numenius phaeopus. *June* 11th. Nigrita canicapilla. *July* 9th. Hyphantornis personatus. Western Africa. All from the Du Chaillu Collection.
- Foard, A. J. *Jan.* 15th. A specimen of the Massena Partridge, (Cyrtornyx massena.) from Camp Verde, Texas.
- Field, Thos. Y. *May* 20th. A collection of Shells from the Bay of Panama and other places, comprising many beautiful specimens of numerous species, several Echini, Minerals, and Saw of a large Pristis. *July* 9th. Tarantula, from Panama. *Nov.* 5th. Numerous specimens of a large Blatta, from Panama.
- Farquhar, G. W. *Oct.* 22d. A small collection of Minerals.
- Fisher, J. Cole. *Nov.* 5th. Argentiferous Galena. Mexico.
- Gerhart, A. L. *Jan.* 22d. A small collection of Devonian Fossils, from Delaware Co., Ohio.
- Genth, F. A. *Feb.* 12th. Millerite, (Sulphide of Nickel.) Lancaster Co., Pa.
- Gibson, Wm. *Feb.* 19th. 5 species Echini, from Isle of Guernsey. *March* 5th. A collection of beautifully prepared Fishes of Lake Geneva, 18 specimens, 16 species; and 8 species of Bird-skins, from Switzerland.
- Gabb, Wm. M. *Feb.* 12th. Egg of Rhea americana. *Feb.* 19th. Paludina integra, reversed. *March* 12th. Palaeoniscus Brainerdi, Thomas, from Ohio; deposited. *April* 2d. Two Coprolites, from New Jersey. *May* 14th. Four specimens Brittus, from League Island, Philada. Malacobdella, from Venus mercenaria.
- Griffith, R. E. *March* 19th. Antlers of a Deer, of which one is double. Adirondac, N. Y.
- Heap, D. P., M. D. *Feb.* 12th. Roman Skull, from excavations of Carthage.
- Harris, E. *Jan.* 1. Oedicnemus. *June* 11th. Nigrita fusconota. Western Africa. Both from the Du Chaillu Collection.
- Hopper, Jas. *Jan.* 8th. A collection of fragments of Mosasaurus, from Monmouth Co., N. J.
- Herbert, O. C. *Jan.* 15th. Vertebra of Mosasaurus, from Monmouth Co., N. J.
- Heuston, G. W., M. D. *May* 14th. Mustela canadensis and a Monkey, deposited.
- Hayes, I. I., M. D. *Dec.* 17th. A collection of living Arctic Plants.
- Heermann, A. L. *March* 5th. 71 specimens (20 species) Reptiles, and a quart bottle of Insects, from Texas. *March* 12th. Skulls of Camelus dromedarius, Dicotyles torquatus, 2 of Canis occidentalis, 2 of Vulpes virginianus, Felis concolor and Bassaris astuta. Buteo Harlani, from San Antonio, Texas. Five casts of Fossil Shells, probably cretaceous, and a dicotyledonous leaf, probably tertiary, from Texas. *April* 16. 3 spec. Bassaris astuta, 3 Lepus artemisia, 2 Neotoma mexicana, 2 Sciurus limitis, from Texas. *July* 2d. Lepus callotis, female and young; 3 small Field Mice; 2 Bats and a mole. San Antonio, Texas. *Sept.* 3d. A collection of Marine Shells, in exchange. *Dec.* 24th. Unio Heermannii, Lea. Texas.
- Haldeman, S. S. *July* 2d. 8 species Ancyclus, being the originals of Prof. Haldeman's Monograph.

- Henderson, A. A., M. D. *July* 9th. 2 spec. *Euprinodes rufogularis*. (Du Chaillu Coll.) Western Africa.
- Jeanes, Samuel. *Jan.* 1st. 3 spec. *Anthus Gouldii*; *Buceros camurus*. Western Africa. *June* 11th. 2 spec. *Hylia prasina*. (All from the DuChaillu Coll.) Western Africa.
- Jeanes, Jos. *Jan.* 1st. 2 spec. *Querquedula Hartlaubii*, 3 spec. *Buceros fasciatus*. (Du Chaillu Coll.) Western Africa. *March* 12th. *Spizætos tyrannus*, *Cymindis uncinatus*, *Circus hudsonius* and *Ortilida poliocephala*, from Jalapa, Mexico; 2 spec. *Ægithalus flavifrons*. (Du Chaillu Coll.) Western Africa.
- Krider, John. *Jan.* 15th. *Sciurus ferruginiventris*. Mexico. *Feb.* 5th. *Lepus americanus*? curious variety. New York. *Aug.* 20. Skull and fetus of a Porpoise.
- Kortright, C. E. K. *Oct.* 8. Fragment of a Meteorite which fell at Dhurmsalla, India, July 14, 1860. *Oct.* 22d. Snout of a Saw-Fish, Southern Atlantic.
- Le Conte, J. L., M. D. *Jan.* 1st. 67 spec. of Mammals (15 genera, 35 species) and 19 species *Vespertilionidæ*, from the late Major Le Conte's collection. *Buceros cylindricus*, *Rallus oculus*, 3 spec. (Du Chaillu Coll.) Western Africa. *June* 11th. A small collection of Plants from the Herbarium of the late Major Le Conte. *July* 9th. 3 spec. *Camaroptera tineta*. (Du Chaillu Coll.) Western Africa.
- Lewis, F. W., M. D. *Jan.* 8th. *Asterias*, from Japan. *March* 19th. Microscopic specimens, consisting of injections, sections of bones, teeth, &c.
- Leidy, Jos., M. D. *Jan.* 1st. Rhynchops. (Du Chaillu Coll.) Western Africa. *June* 11th. 3 spec. *Cisticola*. (Du Chaillu Coll.) Western Africa.
- Lea, Isaac. *Jan.* 1st. 2 spec. *Buceros atratus*. (Du Chaillu Coll.) Western Africa. *June* 11th. *Parisoma olivascens*. (Du Chaillu Coll.) W. Africa.
- Logan, J. D., M. D. *Jan.* 1st. *Buceros fistulator*. (Du Chaillu Coll.) Western Africa. *June* 11th. 3 spec. *Nigrita luteifrons*. (Du Chaillu Coll.) Western Africa.
- Linneecum, G., M. D. *March* 12th. A collection of 800 specimens of Plants from Texas; a collection of 26 species of Shells; also *Exogyra arietina* and several specimens of rocks, from Austin, Texas. *May* 7th. A collection of 682 spec. of Plants from Texas.
- Lamb, W. W. *Feb.* 12th. Fossil Vertebrae of a Shark, and a collection of Crocodilian remains, from Blackwoodtown, N. J.
- Letterman, J. C., M. D. *Nov.* 5th. Two skeletons of the Camel, one of the Rocky Mountain Sheep, and Skull of a Grizzly Bear; 2 specimens, in skin, of *Lophortyx*, *Merula nævia*, *Tantalus loculator* and *Podylymbus carolinensis*, from Fort Tejon, Cal.
- McCall, G. A. *Jan.* 1st. 2 spec. *Laniarius eruentus*. (Du Chaillu Coll.) Western Africa. *July* 9th. *Erythrocerus McCallii*. (Du Chaillu Coll.) Western Africa.
- Morris, E. *Jan.* 8th. Reptilian Tooth, from Coal Fields of Chatham Co., N. C.
- Mackey, J. L. *March* 12th. 6 species Land Shells, from Corisco Island, Coast of Guinea.
- Matthews, G. D. *May* 7th. Magnetic Iron Ore, from Lake Ontario.
- Miles, Manley. *June* 11th. *Unio rudis* and *Planorbis truncatus*. Michigan.
- Mitchell, S. Weir, M. D. *Jan.* 1st. *Stiphronis erythrothorax*, 2 spec. (Du Chaillu Coll.) Western Africa.
- Mitchell, E. C. *July* 9th. Three Salamanders. *July* 23d. Two spec. *Tropidonotus sipedou*.
- Norris, Thaddeus. *March* 5th. A species of *Osmerus*. Schuylkill River.
- Newton, A. *April* 9th. Nest and Eggs of *Ampelis garrulus*.
- Newkirk, Mrs. M. *Dec.* 24th. A fine specimen of Coral. South Pacific Ocean.
- Orthwein, Mr. *Jan.* 1st. *Hylatomus pileatus*, from near Philadelphia.
- Powel, J. Hare. *Jan.* 1st. 2 spec. *Tringa maritima*. Newport, R. I.
- Piggott, J. T. *Jan.* 8th. Curious bent layer of coal slate. Tamaqua, Pa.

- Powel, Samuel. *Jan.* 8th. 20 species of Fish, 3 Asterias and 3 Echinus, from Newport, R. I. *Jan.* 15th. *Physalia pelagica*, from Newport, R. I. *March* 19th. 35 Microscopic specimens. *Nov.* 5th. 17 specimens of the lingual laminae of Mollusks.
- Pennock, Mr. *March* 5th. Specimens of Cannel Coal, Oils, Paraffine and other products of the former.
- Prime, Temple. *July* 2d. 13 species *Corbicula*, *Batissa* and *Cyrena*.
- Perkins, E. L. *Oct.* 1st. *Satin Spar* and *Dogtooth Spar*. Niagara Falls.
- Rogers, F. *July* 9th. 2 spec. *Sycobius cristatus*. (Du Chaillu Coll.) W. Africa.
- Ruschenberger, W. S. W. *April* 2d. *Ostrea*, from Gibraltar. *April* 9th. A number of specimens of Pupa, from Spezzia in Sardinia. *May* 20th. 17 species of Fishes, 6 species of Shells and several Actiniae, from the Mediterranean.
- Rodgers, J. *Dec.* 10th. *Bubo virginianus*. Crosswicks, N. J.
- Reed, J. *Jan.* 15th. Leg Bone? Mosasaurus.
- Rood, O. N. *Dec.* 24th. Stereoslide of Sun Stone.
- Spillman, Wm., M. D. *Jan.* 1st. 26 species of Eocene Fossils and 6 species undetermined, from Mississippi.
- Smock, Uriah. *Jan.* 15th. Fragments of a long bone of Mosasaurus. Monmouth Co., N. J.
- Slack, J. H., M. D. *Jan.* 1st. Skeletons of *Felis domestica*, *Erinaceus europæus*, *Rana rufiventris*, *Lepus cuniculus*, deposited. *Jan.* 15th. A collection of fragments of the lower jaw of Mosasaurus, from marl pits of O. C. Herbert, Monmouth Co., N. J.; also two specimens of Lignite. Sacral vertebrae of Hadrosaurus, N. J., *Belidens flaviventris*. Australia. *Jan.* 22d. 98 specimens of Fossils, from the Carboniferous Limestone of the Isle of Man. *Feb.* 5th. Five specimens of Minerals, from the Laxey mines, Isle of Man. *Feb.* 12th. 63 eggs, 27 species, from Minnesota. *March* 5th. Fossil jaw of a Muskrat. Mercer Co., N. J. *March* 12th. *Melanerpes erythrocephalus* and *Sialia Wilsonii*, from Minnesota. A curious variety of *Mephitis mephitis*, from Crosswicks, N. J. Antlers of *Cervus virginianus*, first year's growth, Warren Co., Penna., deposited. *March* 19th. A small collection of Cretaceous Fossils, from Crosswicks, N. J. *April* 2d. *Mus decumanus*, mounted. *July* 23d. *Ambloplites pomotis*, Oakwood, N. J. *Sept.* 17th. 2500 specimens, 110 species, 84 genera Marine animals, comprising Fishes, Mollusks, Annelides, Radiates, &c., from the coast of Maine. *Oct.* 8th. A fine collection of Monkeys, a number of them mounted, containing 16 specimens—skulls of *Leo capensis*, *Theropithecus gelada*, *Semnopithecus rubricundra*, *Macacus radiatus*, *Macacus philippinensis*, and *Crocota brunea*; skeletons of *Gerbillus afer* and *Molossus rufus*, deposited.
- Smithsonian Institution. *Feb.* 5th. A collection of 55 species of Crustacea. *Feb.* 19th. A collection of 30 species of Mammals. *May* 14th. A collection of 35 species of Corals, types of those described by Prof. J. D. Dana. *June* 4th. A collection of 175 species of fishes, from various localities, chiefly American. *July* 9th. 2 species of *Lanius borealis*. Rocky Mountains. *Decem.* 3d. 2 species of fossil Oyster, from Cape St. Lucas.
- Smithsonian Institution and H. C. Wood, jr. *Feb.* 12th. A collection of Tertiary Fossils, types of species described in the last No. of the Journal.
- Samuels, E. *March* 19th. 33 specimens for the microscope.
- Starr, Jas. *March* 19th. *Conchoderma* parasitic on *Orthagoriscus*, from Newport, R. I.
- Smith, Aubrey H. *July* 9th. *Camaroptera superciliosa*, (DuChaillu coll.) Western Africa.
- Smith, Chas. E. *July* 9th. *Euprinodes schistaceus*, (Duchaillu Coll.) West Africa.
- Sergeant, J. D. *Oct.* 15th. A fine specimen of Malachite. Lebanon Co., Penna.

- Smith, F. G., M. D. *Dec.* 17th. Portion of a skull of the Rocky Mountain sheep.
- Showalter, E. R., M. D. *Feb.* 19th. *Neretina Showalterii*. Coosa River, Alabama.
- Sitgreaves, Thos. *July* 9th. A fine specimen of the Snow Owl, *Nyctea nivea*. Near Easton, Penna.
- Struthers, Wm. *Sept.* 3d. Calamite. New Hampshire.
- Trautwine, J. C. *June* 11th. *Nigrita bicolor*, (DuChaillu Coll.) Western Africa.
- Tryon, G. W., Jr. *July* 23d. 80 species of European and West Indian Helices, not in the collection of the Academy. *Aug.* 20th. 100 species of Land Shells, in exchange. *Dec.* 3d. 2 species of Polyzoa. Pacific. *Sept.* 3d. 10 species of Uniones. Coosa River, Alabama.
- Thomas, A. C. *Dec.* 3d. A specimen of *Vidua paradisæa*. Africa.
- Uhler, W. M., M. D. *July* 9th. 2 species of *Euprinodes olivaceus*, (DuChaillu Coll.) Western Africa.
- Vanderslice, A. *Sept.* 3d. A large Remora.
- Vaux, Wm. S. *Jan.* 1st. 2 species of *Cossypa pœnsis*, (DuChaillu Coll.) Western Africa. *April* 9th. Mesotype. Bergen Hill, N. J., in exchange. *June* 11th. 3 species of *Parisoma malarinia*, (DuChaillu Coll.) Western Africa. Phos. of Lead and Calamine, from England, in exchange.
- Van Amburgh's Menagerie Company. *Oct.* 1st. *Macacus nemestrinus* and *Cercopithecus rufoviridis*.
- Wood, W. S. *March* 12th. *Charadrius vociferus*, very young. Chester Co., Penna.
- Westcott, C. S. *April* 9th. 8 species of Ophiura, Asterias and Spatangus; a small Crustacean. 5 birds' nests and about 15 species of birds' eggs.
- Wood, C. J. *July* 9th. *Peristera Geoffroyi*. Rio La Plata.
- Wright, Mr. *Dec.* 3d. 2 species of Granite, containing Garnets. Chester Co., Penna.
- Wilson, T. B., M. D. *Jan.* 1st. *Peristera Geoffroyi*. Brazil. The following birds, from (DuChaillu Coll.) Western Africa: *Geocichla componota*, *Turdidostris fulvescens*, 3 species; *Sula capensis*, 120 species; *Sterna*, 4 species; *Calidris arenaria*, *Gymnoburco*. *June* 11th. *Macrosphenus flavicans*, 2 species; *Trichophorus notatus*, 2 species; *Andropadus latirostris*, 2 species; *Glaucocinerea*, 2 species; *Streptopelia interpres*, *Totanus hypoleucus*, *Ægialitis pecuarius*, *Ægialitis marginatus* and *Ægialitis zonatus*. *July* 9th. *Hyphantornis cinctus*, *Bias musicus*, *Trochocercus nitens*, 3 species; *Trochocercus?* 2 species; *Porphyrio alleni*, 2 species; *Lobivanellus*, *Squatarola helvetica*, *Lymnicorax flavirostris*, *Himantornis hæmatopus*, *Geronticus olivascens*, 3 species.
- Wood, H. C., Jr. *May* 7th. A large collection of objects of natural history, comprising about 53 species of Fishes, 70 species of Echinoderms, Corals, Sponges, Annelides, &c., from New Providence, Bahamas. *May* 20th. *Anolis principalis* and *Liocephalus*, a number of Spiders and a Star-fish, from Florida and the Bahamas. *June* 4th. A large *Cyclura*, from the Bahamas. *July* 9th. *Sciæna fama*, *Polynemus longifilis*, *Sillago domina*. East Indies.
- Wilson, Aug., M. D. *Nov.* 5th. 4 Lizards, from Cuba; a *Annutia* and a Mantis.
- Wilson, Jos., M. D. *Dec.* 24th. A Crab and a Calassa, from Vera Cruz.
- Yarrow, H. C. *Feb.* 5th. A collection of Sharks' teeth. Allowaytown, N. J. *March* 5th. Fossil remains of the Deer. Green sand of N. J. *July* 9th. A small collection of Fossils.
- Yarrow, T. J., M. D. *Nov.* 12th. Fossil vertebræ of a Cetacean. Cumberland Co., N. J.

## DONATIONS TO LIBRARY.

1861.

## JOURNALS AND PERIODICALS.

## SWEDEN.

Stockholm. Ofversigt af Kongl. Vetenskaps-Akademiens Förhandlingar. Argangen 13, 1856; 16, 1859. From the Royal Swedish Academy, Stockholm.

Kongl. Svenska Vetenskaps-Akademiens Handlingar, Band 2, Heft 2, 1858. From the same.

Kongl. Svenska Fregatten Eugénies Resa Omkring Jorden under befäl af C. A. Virgin Aren 1851—1853. Zoologi, 4. From the same.

## NORWAY.

Urd et Norsk Antiquarisk-Historisk Tidsskrift, 1834—1847. From the Bergen Museum.

## DENMARK.

Copenhagen. Ofversigt over det Rgl. Danske Videnskabernes Selskabs Forhandling, &c., 1851, 1853, 1859. Copenhagen. From the Society.

## RUSSIA.

Dorpat. Archiv für die Naturkunde, &c. von der Dorpater Naturforscher Gesellschaft, Series 2, Band 2 and 3. From the Society.

Riga. Correspondenz blatt des Naturforschenden Vereins zu Riga. Jahrgang 11. From the Soc. of Naturalists in Riga.

St. Petersburg. Bulletin de l'Académie Impériale des Sciences. Tome 2, Nos. 1 to 3. From the Society.

Memoirs de l'Acad. Impériale. Series 7, Tome 2, Nos. 4 to 7. Tome 3, No. 1. From the Society.

## HOLLAND.

Amsterdam. K. Acad. van Wetenschappen. Jarboek voor 1859.

Catalogus van de Bockery. Deel 1, Stuck 2, 1860.

Verslagen en Mededeelingen, Naturkunde. Deel 10.

Verslagen en Mededeelingen, Letterkunde. Deel 5.

Verslag over den Paalworm, nitgegeven door de Natuurkundige afdeling der K. Akad. van Wetensch. Amsterdam, 1860.

All from the Royal Acad. of Sciences, Amsterdam.

Utrecht. Recherches Astronomiques de l'Observatoire d'Utrecht, publiés par M. Hoek. Livr. Ire. 4to. 1861. From the Author, by authority of the Minister of the Interior.

## GERMANY.

Altenburg. Mittheilungen aus dem Osterlande. Band 4, Heft 1 to 4. Band 5, Heft 1 and 2. From the Soc. of Naturalists, Altenburg.

Augsburg. Bericht des Naturhistorischen Vereins in Augsburg. 2d, 3d, 5th, 6th and 7th. Maclure Fund.

Malakozoologische Blätter. Band 8, Bog. 1, 2. From Maclure Fund.

Bericht des Naturhistorischen Vereins in Augsburg. 1859, 1860. From the Society.



- Bamberg. Über das Bestehen und Wirken des Naturforschenden Vereins zu Bamberg. 1852—1859. From the Society.
- Berlin. Monatsberichte der Königl. Preuss. Akad. der Wissenschaften zu Berlin, Jahre 1860. From the Royal Prussian Academy of Sciences.
- Register für die Monatsberichte, &c., von Jahre 1836 bis 1858. From the same.
- Zeitschrift der Deutschen Geologischen Gesellschaft. Berlin, 1860. Band 12, Heft 2. From the Society.
- Wochenschrift des Vereins zur Beförderung des Gartenbaus in den Königl. Preussischen Staaten, &c. Berlin, Nos. 14—52, Jahrgang 3, 1860. Nos. 1—6, Jahrgang 4, 1861. From the Gardener's Soc.
- Archiv für Mineralogie, Geognosie, Bergbau und Huttenkunde. Berlin, 9th, 10th, 11th, 14th and 15th Banden, 1836 to 1841. From G. M. Conarroe.
- Mathematische Abhandlungen der Königl. Akad. der Wissenschaften zu Berlin, aus dem Jahre 1859. Heftes 1 and 2. From the Royal Acad. of Sciences, Berlin.
- Entomologische Zeitschrift. Jahrgang 4, 1860. Heftes 2 to 4. Jahrgang 5, und beifert. From the Entomolog. Soc. of Berlin.
- Bonn. Verhandlungen des Naturhistorischen Vereins der Preussischen Rheinlande und Westphalens. Jahrgang 11, Heft 3. Maclure Fund.
- The same. Jahrgang 17, 1860. From the Society.
- Frankfurt. Der Zoologische Garten, Organ für die Zoologische Gesellschaft. Frankfurt a. M. Jahrgang 2, Nos. 1 to 6. From the Society.
- Göttingen. Nachrichten von der Georg-Augusts Universität und der Königl. Gessellschaft der Wissenschaften zu Göttingen. Jahre 1860. From the Society.
- Halle. Die Natur. Band 8. Jahrgang 1859. From T. B. Wilson, on the usual conditions.
- Hanover. Bonplandia. Band 7. Jahrgang 1859. From T. B. Wilson, on the usual conditions.
- Königsberg. Schriften der Königl. Physikalisch-Ökonomischen Gesellschaft zu Königsberg. Jahrgang 1. Abtheilung 1. 1860. From the Society.
- Leipzig. Bibliotheca Zoologica, Verzeichniss der Schriften über Zoologie, von J. V. Carus und W. Engelmann. Svo. Leipsig, 1861. Band 1st. From Mrs. L. W. Say.
- Kosmos. Dritter Jahrgang, 1859. Vierter do. 1860. Hefts 1 to 9. From T. B. Wilson, on the usual conditions.
- Archiv für Anatomie, Physiologie und Wissenschaftliche Medecin. Jahrgangen 1859, 1860 und 1861, Heft 1 to 5. Maclure Fund.
- Munich. Verzeichniss der Mitglieder der K. B. Akad. der Wissenschaften, 1860. From the Royal Bavarian Acad. of Sciences.
- Abhandlungen der Historischen Classe der K. B. Akad. der Wissen. Band 8. Abtheilung 3, 1860. From the same.
- Abhandlungen der Philosophisch Philolog. Classe der K. B. Akad. der Wissen. Band 9. Abtheilung 1, 1860. From the same.
- Abhandlungen der Mathemat-Physikalischen Classe der K. B. Akad. der Wissen. Band 8. Abtheilung 3, 1860. From the same.
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- Gelehrte Anzeigen. Banden 1 bis 15 und 49 und 50. From the same.
- Sitzungsberichte der K. B. Akad. der Wissen. zu München. Heft 1 bis 3, 1860. From the same.
- Offenbach. Erster Bericht des Offenbacher Vereins für Naturkunde. Offenbach-am-Main, 1860. From the Society.
- Stuttgart. Naturwissenschaftliche Jahreshefte, Jahrgang 16, Heft 2, 3. From the Society.
- Allgemeines Repertorium der Mineralogie, &c., für das Decennium 1850—1859, ein index zu den in Leonhard und Bronn's Neuen Jahrbuch. Svo. Stuttgart, 1861. From T. B. Wilson, on the usual conditions.

- Stettin. Entomologische Zeitung. Jahrgang 21.  
 Linnaea Entomologica. Zeitschrift der Entomologischen Vereine zu Stettin.  
 Band 14.  
 Catalogus Hemipterorum von dem Entomologischen Vereine zu Stettin.  
 All from the Entomolog. Soc. of Stettin.
- Vienna. Verhandlungen der Kaiser. König. Zoologischen-Botanischen Gesellschaft in Wien. Jahrgang, 1860. Band 10. From the Society.  
 Jahrbücher der K. K. Central-Anstalt für Meteorologie, &c., von Karl Kreil. Jahrgang, 1855. Band 7. From the Imp. Acad. of Sciences, Vienna.  
 Entomologische Monatschrift. Band 1 to 4, and Band 5, Nos. 1 to 3. From the Editors.  
 Jahrbuch der Kaiser. König. Geologischen Reichsanstalt. Jahrgang 11, 1860. No. 1. From the Geolog. Institute, Vienna.  
 Die feierliche Sitzung der Kaiser Akad. der Wissenschaften am 30 Mai, 1859. Wien. From the Imp. Acad. of Sciences, Vienna.  
 Sitzungsberichte der K. Akad. der Wissenschaften, Mathematischen-Naturwissenschaftliche Classe. 1860. No. 6 and Nos. 11 incl. and Nos. 17 to 28. Wien. From the same.  
 Jahres-Bericht über die Wirksamkeit des Werner-Vereins zur Geologischen Durchforschung von Mähren und Schlesien. 1 to 10. Jahren 1852 to 1860. From the same.  
 Statuten für den Werner-Vereins, &c., von Mähren und Schlesien. From the same.
- Wiesbaden. Jahrbücher des Vereins für Naturkunde im Herzogthum-Nassau. Heft 14, 1859. From the Society.
- Wurzburg. Würzburger Naturwissenschaftliche Zeitschrift, von der Physikalisch-Medicinischen Gesellschaft. Band 1, Hefts. 2 to 4. From the Society.

## SWITZERLAND.

- Basel. Verhandlungen der Naturforschenden Gesellschaft in Basel. Theil 2, Heft 4.
- Geneva. Bibliotheque Universelle, Revue Suisse et Etrangère. Parts of vols. 8, 9, 10 and 12. From the Editors.  
 Bibliotheque Universelle, Revue Suisse et Etrangère. Archives des Sciences Physiques et Naturelles. New Series. Vols. 4, 5, 6, 1859. From Mrs. L. W. Say.  
 Memoires de la Société de Physique et d'Histoire Naturelle de Genève. Tome 15, part 2d, 1860. From the Society.
- Lausanne. Bulletin de la Société Vaudoise des Sciences Naturelles. Tome 6, Bulletin 47. From the Society.
- Neuchatel. Bulletin de la Société des Sciences Naturelles de Neuchatel. Tome 5. Cahier 1 and 2. From the Society.  
 Memoires de la Société des Sciences Naturelles de Neuchatel. Tome 4. From the Society.
- Zurich. Vierteljahrschrift der Naturforschenden Gesellschaft in Zurich. 1858, Heft 3, 4. 1859, Heft 1 to 4. 1860, Heft 1 to 4. From the Society.

## BELGIUM.

- Antwerp. Bulletin de la Société Paléontologique de Belgique à Anvers. Tome 1, Feuilles 4 and 5. From the Society.

## FRANCE.

- Angers. Memoires de la Société Académique de Maine et Loire. Vols. 7 and 8, 1860. Angers. From the Society.

- Bordeaux. Actes de l'Acad. Imperiale des Sciences, &c. de Bordeaux. Serie 3. Année 22, 1860. Trimestre 1. From the Acad. of Sciences, Belles-Lettres and Arts of Bordeaux.
- Caen. Bulletin de la Société Linnéenne de Normandie. Vol. 5me. Année 1859—60. From the Society at Caen.
- Liège. Memoires de la Société Royale des Sciences de Liège. Tome 15, 1860. From the Society.
- Paris. Museum d'Histoire Naturelle de Paris, Catalogue de la Collection des Reptiles, par M. C. Dumèril. 8vo. Paris, 1851. Smithsonian Institution.
- Comptes Rendus des Seances et Memoires de la Société de Biologie. Tom. 1, 3d Series. Paris. From the Society.
- Revue et Magasin de Zoologie, &c., par F. E. Guerin-Méneville. 1860, Nos. 11 and 12. 1861, Nos. 1 to 10. From the Editor.
- Bulletin Mensuel de la Société Impériale Zoologique d'Acclimatation. Tome 7, Nos. 11 and 12. Tome 8, Nos. 1 to 10. From T. B. Wilson, on the usual conditions.
- Annales des Mines. 5me Série. Tome 16, Livr. 6, 1859. Tomes 17 and 18, 1860. Tome 19, Livr. 1 and 2, 1861. From the Minister of Public Works, France.
- Journal de Conchyliologie. Série 3me. Tome 1, Nos. 1 to 4. From the Editors.
- Journal Universel et Hebdomadaire de Medecine et de Chirurgie Pratiques, &c. Tomes 4 and 5. Paris, 1831. From G. M. Conarroe.
- Annales des Mines. 4me Série. Tome 17, Livr. 1, 1850. 5me Série. Tome 10, Livr. 4, 1856. From Mrs. L. W. Say.
- Bulletin Mensuel de la Société Zoologique d'Acclimatation. Tome 6, No. 9. Tome 7, No. 1. From Mrs. L. W. Say.
- Journal de Conchyliologie. Tome 7, 1858, and Tome 8, Nos. 3 and 4. From Mrs. L. W. Say.
- Annales des Sciences Naturelles. Série 4. Année 7. Tome 11, 12, 13 and 14, Nos. 1 to 4. Botanique. Tome 11, 12, 13, 14 and four Nos. of vol. 15. Zoologie. Maclure Fund.
- Journal de la Physiologie de l'Homme et des Animaux du E. B. Sequard. Tomes 2 and 3, 1859 and '60, and vol. 4, 3 Nos., 1861. Maclure Fund.

## ITALY.

- Bologna. Rendiconto delle Sessioni dell' Academia delle Scienze dell' Istituto di Bologna. 1857—1859. From the Academy.

## GREAT BRITAIN AND IRELAND.

- Dublin. Transactions of the Royal Irish Acad. Vol. 24, part 1st. From the Academy.
- Journal of the Royal Dublin Soc. Nos. 18 and 19, 1860. From the Society.
- Journ. of the Geolog. Soc. of Dublin. Vol. 8, part 3, 1860. From the Society.
- Edinburgh. Edinburgh New Philosoph. Journal. Vol. 11, No. 1. Vol. 12, No. 2. Vol. 13, Nos. 1 to 3. From the Editors.
- Edinburgh Medical and Surgical Journal. No. 175, April, 1848. From G. M. Conarroe.
- Proceedings of the Royal Soc. of Edinburgh. Pages 212 to 348 incl. Session of 1859—60. From the Society.
- Transactions of the Royal Soc. of Edinburgh. Vol. 22, part 2d. Session 1859—60.
- Supplement to the same. From the Society.
- London. List of the Geological Soc. Sept. 1st, 1860.

- Quarterly Journ. of the Geolog. Soc. Vol. 16, part. 4. Vol. 17, parts 1 to 3. From the Society.
- Proceedings of the Royal Society. Vol. 11, Nos. 42, 43, 45 and 46. From the Society.
- Notes and Queries: a Medium of Intercommunication for Literary Men, &c. 4to. London, 1850 to 1857. Series 1st, vol. 12. Series 2d, vols. 1 to 10 incl. Also parts 13 and 14. From Dr. Wm. Camac.
- Do. parts 64 to 70. From the Editor.
- Journal of the Soc. of Arts and of the Institutions in Union. London, vol. 9, Nos. 418 to 440. From the Society.
- Quarterly Journal of Microscopical Science. No. 28. From T. B. Wilson, on the usual conditions.
- The Athenæum. 4 vols. for 1859 and 1860; 1861, parts 397 to 406. From T. B. Wilson, on the usual conditions.
- Notices of the Proceedings of the Meetings of the Members of the Royal Institute of Great Britain. Part 10, Nov., 1859, July, 1860. A List of the Members, &c., with Report of Visitors for 1859. From the Royal Institution.
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CATALOGUE  
OF THE  
FISHES  
OF THE  
EASTERN COAST OF NORTH AMERICA,  
FROM  
GREENLAND TO GEORGIA.  
BY  
THEODORE GILL.  
JANUARY, 1861.



## INTRODUCTION.

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About fourteen years have now elapsed since the publication of Dr. D. H. Storer's "Synopsis of the Fishes of North America."\* That work is the last, and, indeed, almost the only special work that has ever been published, professing to give a complete enumeration of the various species of fishes which have been described as inhabitants of the waters that bound, or course through, our continent. During the interval that has elapsed between its composition and the present day, the progress of Ichthyology, in common with every other branch of Natural Science, has been such, that the "Synopsis of the Fishes of North America" presents a very inadequate view of the present condition of our knowledge. It appeared desirable that a list of the numerous species described in various special works and the Transactions of learned societies should be published, in order to exhibit the extent of our Fauna. The following Catalogue has therefore been prepared, and is believed to be a close approximation to the correct nomenclature of species of our coast.

Dissatisfied with all the existing schemes of classification, we have not strictly adhered to any one, as will be sufficiently evident on examination of the Catalogue. The following arrangement approximates most nearly to that of the late celebrated and learned Johannes Müller, but the orders of *Pharyngognathi*, *Anacanthini* and even *Malacopteri* have been rejected as such, they having apparently no real existence in nature; for convenience of classification, some have been retained as suborders.

We † have already remarked on the close affinity of several genera of the Müllerian *Pharyngognathi* to others of that biologist's *Acanthopteri*; we have cited the mutual resemblance of *Pterophyllum* of Heckel and *Platax*; of *Astronotus* of Swainson and *Lobotes*, and of *Amblodon* ‡ of Rafinesque and *Corvina*, and have remarked that Cuvier had even regarded the respective analogous genera as identical, while the Müllerian classification would refer them to different orders. We may further remind the reader of the very close affinity of the Pseudochromoids to the true Chromoids, and that *Malacanthus*, which has by all naturalists been

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\* "A Synopsis of the Fishes of North America," by David Humphreys Storer, M. D., A. A. S. Cambridge, 1846: *ib.* in "Memoirs of the American Academy," vol. ii.

† "Notes on a collection of Japanese Fishes, made by Dr. J. Morrow," by Theo. Gill, in Proc. Acad. of Natural Sciences, for 1859, p. 148.

‡ "Notice of a collection of Fishes from the southern bend of Tennessee river, in the State of Alabama," by L. Agassiz, in American Journal of Science and Arts, second series, vol. xvii. p. 307.

admitted as a true Labroid, differs from the other genera of that family by the separation of the inferior pharyngeal bones, and would therefore be an Acanthopteran of Müller, and consequently a member of a different order from the Labroids.

But even if the Labroids, the Pomacentroids and the Chromoids are ordinarily distinct from the Acanthopteri, they can scarcely be considered as natural associates of the Scomberesocoids, which have, by Müller, been placed in the same order, but under a distinct suborder. The Scomberesocoids appear, indeed, to be much more nearly related to the Scombroids and their allies than to any other members of the class. This relation we perhaps see more strongly in the genus *Scomberesox* than any other, but in all it is quite apparent. The pinnules or false finlets of *Scomberesox* above and below the caudal peduncle remind us at once of the true Scombroids. The structure of the scales, the mode of squamation, and the lateral carina add to the likeness. We even see an analogous instance of the prolongation of the maxillaries, nasal and frontal bones, to form a beak in the family of Xiphioids, which, by all naturalists, have ever been regarded as very near allies of the Scombroids, and by many as belonging to the same family.

The Aulostomoids have also many characters in common with the Scomberesocoids, and should be apparently classed near them. To those who object, on account of the different nature of the fin rays, to the likeness of *Scomberesox* and the Scombroids as not being indicative of affinity, we would refer to the well known *Solenostomi* (*Channorrhynchi* of Cantor or *Fistulariæ* of Linnæus.) Those fishes are as totally destitute of spines as any of the Scomberesocoids, and yet no naturalist can overlook their affinity to the *Aulostomi* of Lacepede or *Polypterichthys* of Bleeker, each of which have a number of spines before the rayed dorsal fin, and are thus, if we look to single characters only, truly referable to the Acanthopteri. But why need we say anything on the futility of an ordinal classification, based on the nature of the rays alone? It is only necessary to mention the *Ichthyoscopi* of Swainson and *Leptoscopi* and *Dactyloscopi* of Gill among the Uranoscopoids; the *Aspidophoroides* of Lacepede among the Agonoids; the genus *Gobiopus* of Gill, and others among the Gobioids, and the whole family of Pseudochromoids. Convinced, then, that the nature of the rays alone is not sufficient to determine the affinities of fishes, and as there are no important anatomical differences, we have approximated both the Aulostomatoids and the Scomberesocoids to the Scombroids, as well as the Echenioids, which are related to the same fishes through means of Elacates.

To those who refer to the abdominal position of the ventral fins, as an argument against the affinity of *Scomberesox* and the Scombroids, we point to the same Aulostomoids, to the Sphyrænoids, the Atherinoids, and Campylodontoids, and perhaps the Gasterosteoids.

The likeness of *Scomberesox* to the Scombroids has already been

alluded to by Professor Agassiz, who has remarked on the similarity of the finlets of that genus and the Mackerels. Lacepede has himself perpetuated his appreciation of the same resemblance in the name which he has given to the group. Agassiz has also adverted to the affinity of *Echeneis* to *Elacates*—an affinity which has been also recognized and insisted on by Holbrook\* and very recently by Günther.†

The Cottoids and other Sclerogenoids have been removed from the station assigned to them by most naturalists, and are now placed after the Scombroid and before the Blennoid group. The distinction between the formidably armed Sculpins (*Acanthocottus*) and the typical Blennoids, defenceless and almost totally destitute of robust spines, is indeed great, but there is still an evident likeness between them. There is also a strict gradation between the almost Percoid-looking *Sebastes* to the loose-set Blennoid through the long chain of striking forms which have been ranged in the respective families of Sclerogenoids and Blennoids.

From the Blennoids, the passage to the Cod fishes appears to be also gradual. This likeness has been recognized by several of the older naturalists, who have referred Blennoids to the old "genus" *Gadus*, and Gadoids to *Blennius*. The late Prince of Canino‡ had even placed the common "Toad fishes" (*Batrachus*) of the Americans in a group which he has called the order "Gadi," and in which he has also included the Leptocephaloids, Ammodytoids, Ophidioids, Macrurroids, Gadoids and Bibronioids. Nor does the approximation of those fishes to the Gadoids appear very unnatural. There is some likeness between the *Batrachi* and *Raniceps*, but perhaps there is more actual affinity between them and the *Uranoscopoids*, and in the vicinity of the former, we have, at least provisionally, accordingly retained them, thus adopting the views first announced by Agassiz, and recently reaffirmed by Girard. The *Uranoscopoids* themselves are obviously connected with the Synanchoid genus *Trachicephalus*§ of Swainson, and through them with the other Sclerogenoids. The remarkable genus *Dactyloscopus* of Gill shows the affinities of the *Uranoscopoids* to the Blennoids.

This is not the proper place to enter more fully into the affinities of the smaller groups. We turn to the larger.

Müller|| has divided the class of fishes into six subclasses, characterized

\* "Ichthyology of South Carolina," by John Edwards Holbrook, M. D. 4to. Charleston, 1855. (p. 104.)

† On the History of *Echeneis*, by Dr. Albert Günther, in "The Annals and Magazine of Natural History," 1860.

‡ "Catalogo Metodico dei Pesci Europei di Carlo L. Principe Bonaparte," Napoli, 1846.

§ This name cannot be retained, as it had been previously applied to a valid genus of Saurians. The name of *Uranoblepus* may be conferred on it. A new species from China is in the collection of the North Pacific Exploring Expedition, and was collected by Dr. Stimpson.

|| "Ueber den Ganoiden und den natürlichen System der Fische," and various other Memoirs, by J. Müller.

by differences observed in the vascular and nervous systems. Four at least of these are very distinct, and Agassiz\* has recently even suggested that they are entitled to rank as classes, basing his opinion chiefly on the difference of development in each group.

Representatives of five of the subclasses of Müller are found on the Eastern shores of North America. In accordance with the suggestion of Prof. Baird, a synopsis is given of the most obvious and important characters of each.

#### Subclass TELEOSTEI Müller.

The first subclass has been named TELEOSTEI by Müller. The endo-skeleton is almost always osseous. The scapular arch is suspended from the skull; the supra scapula generally connected with the mastoid and paroccipital bones. The exo-skeleton is generally in the form of cycloid or ctenoid scales, but sometimes the body is naked and sometimes covered with bony scales, plates or spines. The optic nerves cross each other in their passage from their respective lobes to the eyes. The *bulbus arteriosus* has almost always only two opposite semilunar valves. The branchial apertures are represented by simple fissures on each side. There are four pairs of true and well developed branchial arches, each of which generally supports free branchiæ. An air-bladder is generally present. The ventral fins vary in position and are sometimes absent.

This subclass embraces by far the largest proportion of existing fishes. If we consider the Plectognaths, the Lophobranchiates and the Siluroids, as members of the group, we may divide it into five natural and easily distinguished orders. Agassiz considers the three orders above mentioned as perhaps more nearly allied to the Ganoids. For the present, we prefer to retain them among the Teleostei.

The orders may be thus characterized :

#### Order TELEOCEPHALI Gill.

The endo-skeleton is almost always perfectly developed. The body is generally covered by ctenoid or cycloid scales. The branchiæ are pectinated. The supramaxillaries and intermaxillaries are always present and separated from each other.† The subopercular bone is almost invariably present.‡ Many of the rays are articulated and branched.

This order embraces the largest number of recent fishes, and is cosmopolitan in distribution. Almost all of the fishes most esteemed as food belong to it.

It is divisible into several suborders.

\* "Contributions to the Natural History of the United States of America, by Louis Agassiz." Boston, 1857, vol. i.

† In the family of Mormyroids, the intermaxillary bones are united, but they are distinct from the supramaxillaries.

‡ It is absent in the Notopteroids.

## Suborder PHYSOCLYSTI\* (Bon.)

The scales, when present, are either ctenoid or cycloid; there are rarely osseous plates. The anterior rays of the dorsal and anal fins, and the first ray of the ventrals are simple or spinous. The ventrals are generally more or less anterior. The lower pharyngeal bones are small and triangular, sometimes united, but generally distinct; the teeth are implanted on the plane surface. The air-bladder never has a duct communicating with the intestinal canal.

The group for which we have retained Bonaparte's name of Physoclysti corresponds nearly to the Acanthopterygians, and jugular Malacopterygians of Cuvier, and to the Acanthopteri, Pharyngognathi and Anacanthini of Müller, the Pleuronectoids being omitted. The differences between those respective groups is so slight, and there is such an obvious similarity between some genera of each that we cannot believe their distinction is founded in nature. We have retained, with Cuvier and Müller, the Pharyngognathan families of Acanthopterygians at the end of the present suborders, but their affinities are probably rather with the Sciecnoids, the Chætodontoids, and even the Percoids. There is indeed a very strong resemblance between the Chromoid genera, *Cichlasoma* of Swainson or *Acara* of Heckel, and *Geophagus* of Heckel and the Percoid Sunfishes (*Pomotis* of Rafinesque†) and *Centrarchi*.

## Suborder HETEROSOMATA‡ Bon.

The chief distinctive feature of this group consists in the unsymmetrical body, the eyes being on one side of the head, and the mouth more or less distorted. The side on which the eyes are situated is dark or variously colored, while the eyeless is almost always white. The scales are either ctenoid or cycloid. The dorsal and anal fins are very long, and composed mostly of articulated rays. The ventrals are jugular. There is no air-bladder.

This suborder was first recognized as an order by Prince Bonaparte. It embraces the well known "Flounders" and "Flat-fishes" of our coasts.

## Suborder PHYSOSTOMI (Müller.)

The scales are generally cycloid, almost the only exceptions occurring

\* Derived from *ψύσα*, bladder, and *κλειστός*, closed, in allusion to the absence of a duct communicating between the air-bladder and mouth, or intestinal canal.

† Ichthyologia Ohiensis.

‡ Heterosomes *Dumeril*, Zoologie Analytique ou Méthode Naturelle de classification des Animaux, Paris, 1806, p. 132, 133.

Heterosomata *Bonaparte*, Catalogo Metodico dei Pesci Europei, 1846, p. 6.  
Dumeril regarded the group as a family.

in the genera *Luciocephalus* of Bleeker,\* *Percopsis* of Agassiz,† and some Characins‡ where all or some of them are ctenoid. The fins are mostly sustained by branched rays, only the first rays being sometimes simple. The ventral fins are always abdominal. The lower pharyngeal bones are separated, and almost always small and triangular, with the teeth on a plane surface. The air-bladder communicates by a duct with the mouth or intestinal canal.

This suborder is almost co-equal in extent with the *Physostomi* of Müller, the *Cyprinoids* being alone withdrawn. It embraces on our own coasts, the Salmonoids, Clupeoids and similar fishes.

#### Suborder EVENTOGNATHI Gill.

The body, with only three exceptions, is provided with cycloid scales.§ All the rays of the fins, except the first of each, are branched. The ventrals are always abdominal. The lower pharyngeal bones are of a more or less falciform shape, greatly developed, nearly parallel with the branchial arches, and provided on the internal surface of the curved por-

\* "Natuurkundig Tijdschrift voor Nederlandsch Indie," vol. i. p. 273, vol. iii. p. 99.

† "Lake Superior; its physical character, vegetation and animals," &c., by Louis Agassiz, Boston, 1850, p. 284.

Prof. Baird ("Iconographic Encyclopædia of Science, Literature and Art," translated from the German of Heck, N. Y., 1851, vol. ii. p. 212) has indicated the affinity of *Percopsis* with the Characins.

‡ In a species preserved in the Museum of the Smithsonian Institution, nearly allied to the *Xiphostomas* of Spix, and especially to the *Xiphostoma hujeta* of Valenciennes, the scales are covered with numerous closely approximated ridges abruptly commencing at the bases of their exposed surfaces, and terminating in as many strong teeth on the posterior margin. Valenciennes has not described the structure of the scales in the species of *Xiphostoma* known to him. But he as well as Müller and Troschel in the "Hortus Ichthyologicæ," have mentioned them as being of moderate size. The ridges and pectinated margins of those of our fish are so strongly marked that it is scarcely possible that they should have been overlooked, if they occurred in the species known to the very excellent naturalists above mentioned.

The dorsal fin of our fish is more posterior than in the typical *Xiphostomas*, being above the anal; the anus is under the anterior rays of the dorsal. In this respect it resembles *Xiphostoma maculatum* and *X. hujeta* of Valenciennes.

Three specimens of the species were collected at Truando, by Mr. Arthur Schott on Lieut. Michler's Expedition to the Atrato river. They will be described under the generic name of *Ctenolucius*. It must remain undecided whether the two species of *Xiphostoma* of Valenciennes, agreeing in the position of the dorsal and anal fins, are really congeneric.

The scales of the common "mossbonker" or "menhaden" (*Brevoortia menhaden* Gill,) and other allied species have also the margins of the scales more or less pectinated. Most of the scales of the Cyprinodont genus *Luciocephalus* of Bleeker or *Diplopterus* of Gray are also ctenoid.

§ The body is destitute of scales in the American genus *Meda* of Girard, and the very characteristic European *Aulopyge* of Heckel. But one species of each is known. The typical species of *Phoxinellus* are also scaleless.



tion with large teeth of various forms. The air-bladder is divided by constriction into two or three portions, and communicates by a duct with the œsophagus.

If the pharyngeal bones are of any value in classification, the Cyprinoids appear to be entitled to distinction as a suborder of the Teleostei. The differences between the form of the pharyngeal bones of this group and those of the Acanthopteri seem to be certainly of much greater value than the difference between those of the latter and the Pharyngognathi. The form in both of those are the same, and the only difference is the separation or coalescence of the lower bones. The pharyngeal bones of the Cyprinoids, on the contrary, have a very different form from those of either of the other orders. Other anatomical peculiarities appear to justify us in the separation of the group from the other Physostomi of Müller. We have accordingly bestowed on it the name of Even-tognathi in allusion to the development of the pharyngeal jaws.

No true marine representatives of the Cyprinoids can be said to exist. The *Hudsonius amarus* of Girard,\* *Leuciscus chrysopterus* of DeKay,† a fish of doubtful genus, and some of the Northern Catostomi‡ are found in brackish or salt water, but they can only be regarded as exceptional examples, and scarcely as true marine fishes. They have consequently been excluded from our catalogue.

#### Order *APODES* Kaup §

The body is always anguilliform, or extremely elongated; the skin is generally naked, rarely covered with minute scales imbedded in the epidermis. The branchiæ are pectinated. The supramaxillaries and intermaxillaries are small or rudimentary. Teeth are planted on the palatine and vomerine bones. With the vomer, the nasal and ethmoid bones are coalescent.¶ The ventral fins are always absent; the pectorals often; the

\* "Researches upon the Cyprinoid Fishes inhabiting the fresh waters of the United States west of the Mississippi valley, from specimens in the Museum of the Smithsonian Institution. By Charles Girard, M. D.," p. 46, *ib.* in Proc. of the Acad. of Natural Sciences, 1856.

† "Zoology of New York, or the New York Fauna," by James E. DeKay. Part iv. Fishes, p. 211, pl. xxx. fig. 95.

‡ Note in the Ichthyology of the voyage of the Erebus and Terror, by Sir John Richardson, p. 58.

The *Rynchana Greji*, mentioned by Sir John as an instance of a purely marine representative of Cyprinoids, is a member of a very different family (Gonorhynchoideæ Val.) and belongs to the genus *Gonorhynchus* of Gronovius, as was afterwards acknowledged by its describer.

§ Catalogue of the Apodal Fish, in the collection of the British Museum, by Dr. Kaup, Professor of Natural History, Darmstadt, London, 1856.

Article "Ichthyology," by Sir John Richardson, in the recent edition of the "Encyclopædia Britannica."

Ichthyology of the Erebus and Terror, by Sir John Richardson, pp. 78, 114.

¶ The skull of the representatives of the genus *Muræna* is thus described by Sir John Richardson:

dorsal, anal and caudal fins, when present, are always confluent; their rays are simple.

This order embraces the "Eels" and "Congers." The Electrical Eel (*Gymnotus \*electricus* Linn.) and the allied forms are excluded from the order as they are true Teleocephali. In that order, there are many genera characterized by an elongated form and the absence of ventrals, but none in which there is the union of characters indicated in the foregoing diagnosis. In the present order alone is the absence of ventrals a permanent feature.

#### Order *LEMNISCATI* Kaup.

This is a small order of doubtful affinity, and is composed of small fishes which are destitute of ventral fins, and which are generally diaphanous, greatly elongated and much compressed or ribbon-formed. An exception is seen in the genus *Helmichthys* of Rafinesque, in which the body is vermiform or subcylindrical. The skull and vertebral column are incomplete and cartilaginous. The blood is colorless, and there is no spleen. The

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"Ossa cranii valida, solida, multa per anchylosin coalita. Ossa premaxillariae maxillaeque desunt. Os nasi cum vomere ethmoideque in unum coalitum, dentiferum, munus ossium premaxillarium sustinens; os palati antice ad columnam orbitae anteriorem ossi nasi per symphysis inhaerens, postice per tendinem pedicello imo mandibulae connexum; cumque osse nasi rictum oris superiorem conficiens. Mandibula longa, occiput postice aequans vel transiens. Ejus pedicellum tympanicum os unicum, validum, triangulare in latere cranii late inhaerens."

Richardson remarks that the nomenclature of the bones of the skull of these fishes is a subject of no little difficulty, and he has gladly availed himself of that proposed by Professor Owen in his Lectures on the Vertebrata.

\*The Gymnotoids are remarkable for the advanced position of the anus, which is under the throat, and in the typical species of *Rhamphichthys* (Müller and Troschel) even before the eyes and between the limbs of the lower jaw. But the advanced anus is not peculiar to those fishes. It also occurs in the Aphredoderoids, and the Hypsæoids, both of which are North American forms. The latter have now at least two, and perhaps three distinct genera—*Amblyopsis* of Dekay, blind and provided with ventral fins; *Chologaster* of Agassiz, with eyes, but without ventral fins; and *Typplichthys* of Girard, appearing to differ from *Chologaster* only by its rudimentary eyes. It may be doubted whether the last two are distinct.

They bear nearly the same relation to each other that the "crawfish" of the Mammoth cave does to the numerous species found in our streams. Yet no carcinologist has attempted to generically distinguish the one from the others. All are for them true *Cambari*. There is an atrophy of a single organ; all other parts of their organization are similar. The single modification is adapted for a special purpose; to fit them for a peculiar habitat; there is no need of the organs or the sense, and they have been therefore withheld from them. As the modification is determined by habitat and not independent of it, it has scarcely a generic value unless accompanied by some other peculiarity.

Bourguignat in the "Revue et Magasin de Zoologie" for 1856, (vol. viii. p. 499) has established a genus, which he has named *Zospeum*, for a group of terrestrial Gastropod Mollusks peculiar to the caves of Central Europe. Its species had been previously by most naturalists referred to *Carychium*.

body is entirely naked, and the arrangement of the muscles is very apparent.

It is very doubtful whether this order truly belongs near to the preceding orders, and it is only provisionally retained here. By Sir John Richardson, in the valuable essay on "Ichthyology," in the *Encyclopædia Britannica*, it is placed as a third suborder of the Dermopteri of Owen. Until it is better known, we prefer to retain it among the Teleostei, to which, notwithstanding the rudimentary condition of its organization, it appears to be more nearly allied. Sir John Richardson referred it to the Dermopteri on account of the "absence of ossification in the skeleton, the gelatinous condition of the sheath of the spinal marrow, which, in the form of a 'chorda dorsalis,' reaches into the base of the skull, and the persistence of the primordial cartilaginous cranium."

A single species, the *Leptocephalus gracilis* of Storer, is found on our coast.

#### Order *NEMATOGNATHI* Gill.\*

The body is either naked, or protected by ganoid plates. The branchiæ are pectinated and supported on four arches as in the Teleocephali. The supra-maxillary bones are little developed, and are enveloped in the integuments which terminate in longer or shorter barbels. The subopercular bone is always absent. The rays are mostly articulated and branched.

This order embraces the "Catfishes," "Horn-pouts" and "Bull-heads" or *Ictaluri*† of North America. It embraces five families, and about one hundred and thirty or forty genera, which are chiefly represented in Asia and South America.

He has remarked on the general absence of sight in those animals found in caves and localities from which the light is excluded, and concludes that the want of that sense is of generic importance. While we are disposed to believe in the validity of the genus established by him, we can scarcely coincide in his views. The modification of a single organ dependant on the mode of life, we cannot yet regard as by itself of generic importance. But in most cases, such a modification is accompanied by others, and in conjunction with them, it assumes a systematic value.

These remarks have little relation to the subject in hand, but we have been naturally, although unintentionally, led to them, and think it advisable to retain them.

\*"Ichthyologiæ Archipelagi Indici Prodomus, auct. P. Bleeker," vol. 1. *Siluri*; *Ib.*, in "Acta Societatis Scientiarum Indo Nederlandicæ," vol. iv. 1858, is a valuable monograph of the order.

†Rafinesque first named and well defined the group of fresh water "Catfishes" of North America, conferring upon them the subgeneric name of *Ictalurus*, and dividing that subgenus into sections, some of which are of generic value. We admit four, *Ictalurus*; *Amiurus*, of which the common catfishes of the eastern streams are representatives; *Hopladelus*, and *Noturus*. These genera will be described and illustrated in the forthcoming report of Captain Simpson, U. S. A.

Order *PLECTOGNATHI* Cuv.

In this order the internal skeleton is less perfectly developed than in the Teleocephali. The exterior is covered with ganoid plates, granulations or spines. The supramaxillary and intermaxillary bones are united together into a continuous piece. The branchiæ are pectinated; the branchial apertures small. The air-bladder has no duct.

In this order the Diodontoids and Tetraodontoids, popularly called "Puffers," "Blowers" and "Balloon fishes," and the Balistoids or "Trigger fishes," are included.

Order *LOPHOBRANCHII* Cuv. (Kaup.)\*

The internal skeleton is less perfectly developed than in the Pectini-branchiata. The external skeleton is composed of polygonal plates, of an osseous and corneous structure, and which are joined to each other, but permit considerable mobility in the animal. The jaws are produced into an elongated tubular mouth. The branchiæ are tufted; the branchial apertures small and on each side of the nape. The air-bladder has no duct communicating with the intestinal canal.

This order embraces representatives of only two genera on our coasts, the well known "Pipe-fishes" and "Sea-horses," or the *Syngnathi* and *Hippocampi* of naturalists. In the tropical, and especially the Asiatic seas, the order is represented by quite a large number of genera and species, which have been distributed by modern systematists among three decidedly distinct families.

Subclass *GANOIDEI* (Agassiz) Müller.

The subclass of the *GANOIDEI* or Ganoids, as revised by Müller, embraces forms in which the vertebral column and skull are either osseous or cartilaginous. The scapular arch is directly suspended from the skull. The exo-skeleton is generally deposited in the form of ganoid plates, but there are, in representatives of some families, oval or cycloid scales, and the body is still more rarely naked, and the bony plates absent. The optic nerves, like those of the Plagiostoms, are only connected by commissure and do not decussate. The *bulbus arteriosus* is muscular, and provided with two or more rows of valves, which in one order are replaced by two spiral and longitudinal valvular folds. The intestine has frequently, but not always, a spiral valve. There are no special intromittent organs. The branchial apertures are simple fissures or spiracles on each side, as in ordinary fishes; the branchiæ are free. An air-bladder is present, and communicates by a duct with the intestinal canal. The ventrals are abdominal.

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\*"Catalogue of Lophobranchiate Fish in the collection of the British Museum. By J. J. Kaup, Ph. D. &c." London 1856.

Article "Ichthyology" by Sir John Richardson, in the recent edition of the "Encyclopædia Britannica."

This subclass embraces, according to the views of Agassiz and Müller, the recent sturgeons and the gar-pikes, and the *Amias* of the fresh water streams and lakes of America.

The subclass of Ganoids, as here restricted, is one of the most interesting divisions of the class of Fishes. Some of its representatives are so nearly similar in external form and appearance to true fishes or Teleostei, that a naturalist, unacquainted with the anatomical characters of the species, might well be excused for considering them as members of the same family. Such are the *Amiæ* of North America, and the Erythrinoids of South America. The former have the optic nerves connected by a simple commissure and not decussating, and the bulbus arteriosus furnished with many valves; it is, therefore, a true Ganoid. The Erythrinoids exhibit decussating optic nerves, and a single pair of opposite valves in the bulbus arteriosus; they are, consequently, true fishes or Teleostei. Yet in external characters, there is a very strong resemblance between them, and they were indeed placed next to each other and in the same family by Cuvier. *Amia* is provided with a sublingual bone, but this is not a character peculiar to the Ganoids; for the family Elopoidæ, composed of the genera *Elops* of Linnæus and *Megalops* of Lacepede, is distinguished by the presence of a similar bone. Professor Agassiz has indeed expressed an opinion that, on account of the structure of the scales, and on other grounds, the genus *Megalops* may be a member of his order of Ganoids. The reasons for arriving at such a conclusion have not been given by him. One reason might well be the presence of such a sublingual bone, especially if, as appears to be the case, such an appendage is peculiar to the Elopoids among the subclass of Teleostei. And there is, indeed, no very inconsiderable resemblance between the Elopoids and the species of some of the families of Holostean Ganoids which have no living representatives. Such are the Leptolepoids, which are generally regarded as true Ganoids. But unless the Elopoids have the structure of the brain and the simple chiasma of the optic nerves as well as the two or more rows of valves in the bulbus arteriosus, they cannot, without a new conception of the characters of Ganoids, be referred to that subclass.

In other forms, characters are seen which indicate their affinity with the Amphibians and Reptiles; traits which were formerly supposed to be peculiar to those classes have now been found in representatives of this subclass of fishes. The most singular and remarkable of those types are the paradoxical *Lepidosirenes* of South America, and *Protopteri* of Africa. The former were first described by Fitzinger and Natterer as amphibian reptiles, most nearly allied to the Sirenoids of North America; the latter, first named by Owen *Protopteri*, and afterwards, on the publication of the memoir of Fitzinger, referred to the genus *Lepidosiren*, were placed among the fishes. The rank and affinities of those animals have since attracted much attention from naturalists, and besides the eminent ones above-mentioned, the accomplished anatomists and zoologists, Bischoff,

Milne-Edwards and Müller have added to our knowledge of their organization, and each has discussed their affinities from various points of view.

Although such learned biologists as the Professors Bisehoff and Milne Edwards have believed in the accuracy of the reference of the *Lepidosirenoids* to the Amphibian reptiles, the greatest number of zoologists has regarded them as true fishes. The first of these are undoubtedly Owen and Müller, each distinguished by the most profound knowledge of the anatomy and characteristics of the classes of the Vertebrata.

Professor Owen, in the "concluding observations" of his admirable memoir of the *Lepidosiren annectens*, has fully reviewed the relations of that species, and has pronounced an unqualified belief in its piscine affinities. He has shown that it is proved to be a fish, "not by its gills, not by its air bladders, not by its spiral intestine, not by its unossified skeleton, not by its generative apparatus, nor its extremities, nor its skin, nor its eyes, nor its ears, but, simply, by its nose." In all of its characters, except the last, it agrees with some of the lower Amphibians. He yet warns the student "that the physiological consequences of the modifications of the nasal cavity, above alluded to, would have been far too insignificant to have established the ichthyic nature of the *Lepidosiren*, if, with coëxistent gills and lungs, the modifications of the other organic systems had agreed with those of the Perennibranchians instead of with those of Fishes." As his remarks that follow are pertinent to the subject of the present memoir, we take the liberty of quoting them:—

"For, although it be true, that the fish-like modification of any single system is insufficient of itself to determine the removal of the *Lepidosiren* from the *Amphibia*, in which it has hitherto been placed, to the class of Fishes, yet it is impossible to avoid arriving at that conclusion, when we consider the concurrence of ichthyic characters in so many parts of the organization of this most interesting species. The combination of cycloid scales, mucous duets, quasi-fins, supported each by a many-jointed ray, a gelatino-cartilaginous vertebral style united to the whole surface of the basi-occipital, and not to two basilar condyles, the preopercular bone, the simple structure of the lower jaw, the double spines of the neur- and hæm-apophyses, the green color of the ossified parts of the skeleton; these external and osteological characters being associated with an intestinal spiral valve, with the absence of pancreas and spleen,\* the position of the anus anterior to the allantoid bladder, a dicœleus heart, six pairs of branchial arches, with the gills concealed, the simple organ of

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\*Müller or Peters has demonstrated the existence of a spleen in the *Rhinocryptis amphibia* of Peters, which is doubtless a species of Owen's genus *Protopterus*. It is large, and situated behind the stomach and commencement of the intestinal canal, and beneath the peritoneal coat of the tractus intestinalis. It must be separated from the black pigment which forms a copious substratum beneath the peritoneal covering of the intestines.

hearing consisting only of the acoustic labyrinth excavated in cartilage and provided with large otolithes, and, lastly, the blind nasal sacs, form a cumulative body of evidence in proof that the *Lepidosiren* is a fish, which far outweighs the argument to the contrary, founded on the reptile-like development of its air-bladder and its conversion into an organ of aerial respiration."

After this able and elaborate summary, it will be only necessary to notice some of the objections that have been since brought against the reference of the Lepidosirenoids to the class of Fishes. The most prominent of those objectors are Bischoff and Milne Edwards. The former, influenced especially by the consideration of the position of the posterior nostrils, believed that they were true Amphibians. He found that the hinder nostrils opened into the cavity of the mouth near to the commissure of the lips. Milne-Edwards himself admits that their abnormal position may be in part accounted for by the absence of superior maxillary bones. Nor is such a termination of the olfactory canal peculiar to the Lepidosirenoids. An analogous arrangement occurs in the whole family of Ophisuroids of Kaup, which has, consequently, been placed by that naturalist in a peculiar section, called by him "Cryptomycteres." Those apodal fishes "have a posterior nostril, which is placed in a cleft on the border of the lip, or perforates the inner soft part thereof." The slight resemblance or analogy to that family in its elongated form, and the character of the vertical fins, may be also remarked. It is further worthy of note that in the Ophisuroids, as members of the order of Apodes, the supramaxillary, as well as the intermaxillary bones are small. But in the other families of Apodes, the nostrils preserve nearly their usual ichthyic position and relation to each other.

Milne-Edwards again urges as a previously neglected argument in favor of the Amphibian nature of *Lepidosiren*, the opening of the ductus pneumaticus of the pulmonary sacs into the *ventral* face of the digestive canal. But we also find a similar arrangement in the species of the genus *Polypterus*, animals whose piscine characters and affinities have never been called in question.

Milne-Edwards commences with the observation that the lungs of the Mammals, Birds and Reptiles, as every one knows, always originate from the *ventral face* of the digestive tube, whatever their position may be in the splanchnic cavity, and it is only on the ventral side of the pharynx that the opening of the glottis is found. He continues and remarks that "it is the same with the *Lepidosiren*; and if the resemblance between the lungs of all these animals and the air-bladder of the *Lepisosteus* and of the *Amia* was as great as Mr. Owen seems to think it is, we ought to find this same character of organic relationship between the œsophagus and the bladder of these fish. Now, it is quite the contrary; for the kind of pseudo-glottis which establishes the communication between this cellular pouch and the digestive tube, originates from the *dorsal face* of the

œsophagus. There exists, then, a fundamental anatomical difference between these parts, whatever else may be their physiological functions, and this difference furnishes a fresh argument in favor of the opinion of those who consider the *Lepidosiren* as a reptile."

The resemblance of the air-bladder of the *Polypterus* to the pulmonary sacs of *Lepidosiren* has been justly insisted on by Owen. The air-bladder of *Polypterus* is described by him as being double, consisting of two long cylindrical lobes, but of unequal length, the left being the longest, and extending through the whole length of the abdomen. It has also been stated to communicate by an elongated fissure with the *ventral floor* of the throat. The fissure is also said by Geoffroy St. Hilaire to be provided with a constrictor muscle.

There is then no fundamental difference between the pulmonary sacs or air-bladders of the Lepidosirenoids and the Polypteroïds. If *Lepidosiren* is to be regarded as an Amphibian on account of the communication of the pulmonary sacs with the inferior face of the intestinal canal, then, for the same reasons, the Polypteroïds are to be considered as Amphibians. But the affinities of the Polypteroïds with the Lepidosteoids of America are undeniably very great; the latter have the lung-like air-bladder communicating by a long fissure with the *upper region* of the œsophagus, and thus agree with the fishes. The comparatively slight importance of that character alone in determining the classification of *Lepidosiren* is then evident.

It is a fact of no little interest that the *Polypteri*, which have an air-bladder so similar to that of the *Lepidosirenes*, do also, of all known fishes, most resemble them in the form and development of the different elements of the brain.

The attachment of the scapular arch directly to the skull is one of the strongest evidences of the pertinence of the Lepidosirenoids to the class of Fishes. The *Protopterus annectens* is asserted by Owen to have "the scapular arch directly suspended to the skull, but with this peculiarity, that it is connected by a synovial joint with the exoccipitals only." It is the *fact* of suspension of the scapula to the skull that is of value in this case; the *manner* or *means* by which it is suspended is abnormal, and does not occur in other fishes. Professor Owen has then remarked that "in all osseous fishes, and in those Ganoïds, as the Sturgeons, c. g., that come nearest to the *Lepidosiren* in some parts of their structure, the scapula is suspended by two processes to the paroccipital and to the mastoid."

The jointed pectoral and ventral filaments of *Protopterus* still further indicate the affinity of Lepidosirenoids to the fishes. Those of the so called *Rhinocryptis amphibia* have been described by Peters as not merely consisting of single articulated rays, "but also of cartilaginous rays which emanate from the inferior margin of the main limb or principal ray of the fin, and to which still finer cartilaginous filaments are attached.



These rays are not extensions of the main limbs of the fin, but are attached; the length of the rays diminishes towards the end of the main limb or principal ray of the fin until it becomes inappreciable; the extremities of the rays do not lie loosely upon the skin, but the whole fin is covered by a prolongation of the skin, which also covers the principal ray of the fin. In the pectoral fins, the beard of the fin is as long as its ray. In the ventral fins, one-third of the length of the ray is free at the base of the fin; this then commences very low and remains much lower than in the pectoral fins. In the latter, the beard of the fin external to the ray is three lines broad in its widest part. This kind of formation of the fins, in which the rays arise laterally from a main ray, is quite peculiar, and we have no other example of it amongst fish, except in the dorsal fin of *Polypterus*."

The structure of the ventral fins of the singular genus *Bregmaceros* of Thompson, or *Calloptilum* of Richardson, furnishes a much more evident analogy to the pectoral and ventral members of *Protopterus* than does the structure of the dorsal fin of *Polypterus* above cited. The ventral fins of *Bregmaceros mirus* of Richardson, formerly described as *Calloptilum mirum*, is thus made known by its describer.

Each ventral fin is "composed of three long, tapering jointed rays, having oblique joints at their bases and transverse ones near the tips. In a small piece of membrane which lies in the axilla of the long rays, there are sixteen short jointed branches, which are grouped so that they may be the tips of three, or perhaps more rays."

The structure so described appears to be strictly analogous to that of the pectoral and ventral members of the *Protopteri*. The genus *Bregmaceros* is composed of two species found in the Chinese seas; it belongs to the family of Blennoids, a family which is distinguished partly by the small number of rays in the ventral fins; the number is rarely more than two or three. The "three long, tapering jointed rays" of *Bregmaceros* represent the ventral rays of the normal Blennoids, and the branches which lie in the axillæ of the inner rays are supernumerary, of which no other group, except the Lepidosirenoids, is known to furnish an example.\*

The *Protopterus* of Owen and *Rhinocryptis* of Peters have each only a single auricle and ventricle to the heart. This has been positively stated by Owen and Müller or Peters.

In the genus *Lepidosiren*, embracing only elongated species like the type of the genus, the rays have been described as simple, and the heart has been said to have two auricles.

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\* From an examination of the figure of the male of *Anableps* in the eighteenth volume of the "Histoire Naturelle des Poissons," it might be supposed that the anal fin of that fish furnished another analogous instance. Such is not the case; the artist has erroneously represented its structure. And even if the anal rays were attached to the genital production as represented in the figure, the case could scarcely be regarded as analogous to that of the pectoral and ventral members of *Protopterus*.

The close affinities of the *Protopteri* and *Lepidosirens* cannot be denied. If the observations which have been made on *Lepidosiren* are correct, the result is then only to demonstrate that naturalists have placed too great value on the partition of the heart. It is indeed certain that the presence of two auricles is not even a positive character of the Amphibians. In the genus *Proteus*, the heart is said, by Owen, to possess a single undivided auricle, and he well remarks that "were even the 'septum auricularum' absent in the Salamander or Frog, these would not, therefore, be Fishes.

It would appear, then, that doubt can not much longer be entertained of the pertinence of the *Lepidosirenoids* to the class of Fishes, or at least to a class different from the Amphibians, if, with Professor Agassiz, we should admit that four classes are confounded among the Fishes. The more our knowledge of the anatomy of the Ganoids and the characteristics of Fishes is increased, the stronger becomes the evidence of the relations of the *Lepidosirenoids* to Fishes. The analysis of Owen, and the preceding remarks, will fully confirm the truth of this assertion.

If the question of pertinence of those animals to the class of Fishes is decided in the affirmative, there still remain to be discussed their position in that class, and the station and rank to which they are entitled.

Müller has formed a distinct subclass which he has called *Dipnoi*, and which is principally characterized by the presence of true scales on the body, the possession of both lungs and gills, and the internal structure of the *bulbus arteriosus*. Can this subclass be retained?

The similarity of the air bladder of the *Polypteri* to the pulmonary sacs of the *Lepidosirenoids* has been already commented on. There seems to be no essential difference between the two, either anatomically or physiologically. The branchial arches with their branchiæ are alike present in each, and although those of *Lepidosiren* are somewhat modified, they also are essentially the same as in the *Polypteri* and the rest of the Ganoids. The presence of cycloid scales is not decisive, for such are found to be possessed by species of the genus *Amia*, and by other *Cycloganoids*.

There is one difference, however, between the true Ganoids of Müller and his *Dipnoi* which is of considerable importance. The Ganoids have been characterized by Müller as fishes provided with numerous valves in the arterial trunk. In this respect they differ from the *Dipnoi*. Professor Owen has given the following description of the arterial trunk or *bulbus arteriosus* of the *Lepidosiren annectens*, or rather *Protopterus annectens*:

"This body presents externally a simple transversely oval form, but its internal structure is more complicated than would be suspected from its external appearance. It is formed by a short spiral turn of the dilated aorta, which is concealed under a simple continuous outer fibrous coat: the area of this part of the vessel is almost entirely occupied by two continuous valvular projections, or their processes, which are attached by one edge to the internal surface of the aorta, and have the opposite margin pro-

jecting freely into the arterial cavity. If these internal valves were straight, they would resemble the single thicker valvular process which occupies the elongated bulbus arteriosus of the *Siren*; here, however, they follow the spiral turn of the aorta."

This structure of the arterial trunk has perhaps more analogy to that of the Amphibians than to that of fishes; but the two longitudinal valvular projections or ridges of the arterial trunk of *Protopterus* appear, nevertheless, not to be fundamentally different from the longitudinal rows of valves found in the trunk of the Ganoids, especially of the Amioids. By the coalescence of the valves of each of the respective rows in the bulbus arteriosus of the *Amiee*, analogous ridges would be formed.

Another distinction from all other fishes is produced by the abnormal suspension of the scapular arch only to the exoccipital bones of the Lepidosirenoids.

The importance of both of the above mentioned peculiarities is undoubtedly of considerable value, but it is very doubtful whether they alone are of sufficient importance to authorize the separation of the Lepidosirenoids from the subclass of Ganoids.

The Lepidosirenoids have many affinities with the Ganoids. The brain bears a considerable resemblance to that of the Polypteroids and the Acipenseroids; the persistent notochord, combined with ossified vertebral elements, recalls to mind the similar structure which prevailed in many of the older representatives of the subclass; the strict homology of the pulmonary sacs and communication with the intestinal canal of *Lepidosiren* and *Polypterus*; the presence of a spiral valve in the intestines; the abdominal position of the ventral members, are all characters which indicate the close alliance of the Dipnoi and Ganoids. Cycloid and regularly imbricated scales are found on the recent Amioids of America, and in extinct representatives of the order. We appear then justified in considering the internal structure of the arterial trunk, and the mode of attachment of the scapula to the cranium, as of secondary value. As the Dipnoi agree in all other essential respects with the Ganoids, we will then at least provisionally consider them as belonging to the same great subclass for which the latter name may be retained.\*

Professor Owen has for the most part adopted the classification proposed by Müller, but has not recognized the subclasses, of which six were named

\* It was not until some time after the completion of the above remarks that the observation of Müller respecting the reference by Agassiz of the genus *Lepidosiren* to his order of Ganoids was noticed. The reasons assigned by Agassiz for that act have not been stated. We do not know where that naturalist has published his observations. In his recent *Essay on Classification*, the Ganoids are simply accepted as a class with three undoubted orders called *Cœlacanth*s, *Acipenseroids* and *Sauroids*; and three doubtful ones, the *Siluroids*, *Plectognaths* and *Lophobranch*s. It can scarcely be intended to refer the *Lepidosirenoids* to any of those orders. We remain, therefore, in doubt as to the position that Professor Agassiz would assign to them.

by that zoologist, and has united the Marsipobranchii and Pharyngo-branchii, which were believed by Müller to form distinct subclasses, into one order. The Lepidosirenoids are regarded as forming the ninth order in an ascending rank ; on that order, the name of Protopteri has been bestowed.

Do the Ganoids form an integral part of the class of Fishes? Are the distinctions between the Müllerian Ganoids and Teleosteans then of no more than ordinal value?

Naturalists will admit that the differences between the natural groups that have been named Teleostei, Elasmobranchii, and Dermopteri, are of much greater value than those which have been employed to separate the Teleostei into the groups that have been called orders. It may be objected to this view that orders are not necessarily of equal value. Such may be admitted to be the case: orders may be of quite unequal value. But there are between the groups above named, important fundamental differences which can scarcely be considered as of only ordinal value. The distinctions between them, as well as the Ganoids, have been even regarded by Agassiz as indicating classical value. While naturalists will not probably, at least immediately, accept this doctrine, it must still be admitted that three of those groups, if not all, are of much more than ordinal importance. For the present, then, they may be regarded as subclasses.

But it will be doubtless questionable with some whether the Ganoids are entitled to an equal rank with the Elasmobranchii and the Dermopteri; whether they do not themselves belong to one subclass composed of them and the Teleostei, or typical fishes.

Although the Ganoids do not externally present the same trenchant characters as the Elasmobranchii and Dermopteri; although there is considerable resemblance between representative genera of the Teleostean and Ganoid groups: and though the limits of those groups have been and may perhaps be still considered doubtful,—there are important and permanent anatomical distinctions between them, and those anatomical characters have been regarded as possessing real value. While, therefore, we may admit that there is not as great differences between the Teleostei and the Ganoids, as between the other subclasses, we may still, believing that groups need not be of exactly equal value, regard those two as representing distinct subclasses. At the same time, it is admitted that future researches and more profound investigations may demonstrate the unity of those subclasses.

Those researches may also confirm the idea of the absence of homogeneity in the class of Fishes, and prove that three classes are compounded under that name which are equivalent to the subclasses, as here adopted, of the Dermopteri, the Elasmobranchii, and the united Teleostei and Ganoids. The two latter may then be found to form the subclasses of that class.\*

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\*There is still room for doubt as to the value of the distinctions between the various groups of the cold blooded vertebrated animals. Professor Owen has pro-

The subclasses of Ganoids as now characterized may be provisionally divided into four orders, for which may be accepted the names of *Holostei*, *Placoganoidei*, *Chondrostei* and *Dipnoi*.

#### Order *HOLOSTEI* Müller.

The order of *Holosteans* embraces those fishes provided with plates which are either rhomboid and tiled or oval and imbricated. The hyoid apparatus has one or many branchiostegal rays. The centre of the vertebræ are either ossified or represented by a persistent notochord; the neuropophyses and hæmapophyses are always ossified. The dorsal and anal fins are sustained by true dermo-neural spines articulated with the inter-neural spines. The scapular arch is suspended by two processes to the paroccipital and the mastoid bones, and sustains well developed pectoral fins provided with many rays. The abdominal ventral fins are also supported by several rays. The bulb of the aorta has several longitudinal rows of valves.

The order of *Holosteans*, as thus limited, embraces among recent fishes only the families of *Lepidosteoids*, *Polypteroids* and *Amioids*, but the number of its extinct representatives is very large. The order itself may be subdivided into two suborders, to which may be given the names of *Rhomboganooids* and *Cycloganooids*,—there appearing to be a certain correlation between the form and structure of the plates or scales and the rest of the organization. The first two of the three orders above enumerated are *Rhomboganooids*; the family of *Amioids* belongs to the suborder of *Cycloganooids*.

#### Order *PLACOGANOIDEI* (Owen.)

This group, which is now elevated to the rank of an order of the subclass of Ganoids, was first accepted by Professor Owen, as a suborder of the order of *Ganoidei*; the name conferred on it by Owen has been retained as the ordinal designation. Its representatives are confined to the earlier ages of the world's history. Their internal skeleton was either entirely cartilaginous or the notochord was persistent. The head and anterior part of the body were encased in a dense and compact helmet and coat of mail. The posterior part of the body was covered with comparatively small plates of various forms.

posed that they should be considered as forming a single class, of which the Reptiles and Amphibians of most modern zoologists may belong to one subclass and the Fishes to another. Other naturalists consider the Amphibians as more nearly related to the Fishes, and together separated from the true Reptiles by the absence of the allantois which more or less envelops the embryo of the latter. It might be equally appropriate to unite with Professor Owen all the cold blooded Vertebrata in one class, for which the Owenian name of *Hæmatocrya* may be retained, or to separate them into five or perhaps six classes, those of the Reptiles, the Amphibians, the Fishes, the Elasmobranchiates, the Dermopteri, and possibly the Ganoids.

Order *CHONDROSTEL*, Müller.

The body is sometimes naked, but in most of its species is covered with more or less interrupted rows of osseous or ganoid plates of irregular form. There are also many smaller plates or tubercles scattered on different parts of the body. There are no true branchiostegal rays.\*

The vertebræ and their elements are cartilaginous. The skull is also generally cartilaginous, but is sometimes imperfectly ossified anteriorly. The scapular arch is suspended by two processes to the paroccipital and to the mastoid bones; it supports two well developed pectoral fins. The ventral fins are also furnished with several rays. The bulb of the aorta is furnished with several longitudinal rows of valves.

This order embraces two families of recent fishes; the Sturionoids of the northern portions of the old and new worlds, and the Polyodontoids peculiar to the rivers of the central parts of North America.

Order *DIPNOI* Müller.

The body is elongated, and covered with regularly imbricated cycloid scales. The centra of the true vertebræ are cartilaginous, the notochord being persistent. The neuropophyses and hæmapophyses with their respective spines are osseous. The continuous vertical fin or fold, encircling the posterior part of the body, is sustained by *articulated* rays, immediately connected with the spinous processes of the neuropophyses and hæmapophyses. The scapular arch is suspended only to the exoccipital bone, and supports on each side a simple unjointed or articulated ray. The ventral fins are also represented by a simple ray on each side. The bulb of the aorta is furnished internally with two spiral ridges or valves.

Of this order, only a single family, embracing two genera, is known. The genus *Lepidosiren*, of Natterer, is confined to South America, and the *Protopteri*, of Owen, to Africa.

## Subclass ELASMOBRANCHII Bon.

The ELASMOBRANCHII of Bonaparte and Müller have the endo-skeleton or vertebral column and skull cartilaginous, or very imperfectly ossified. The exo-skeleton is developed in the form of placoid granules. The brain is much more complex and highly developed than in the true fishes: the optic nerves are connected by a commissure, but do not cross each other. The *bulbus arteriosus* or *aorta* has a thick muscular coat, and is provided with at least two rows of semilunar valves. The intestine has a spiral valve. The males are provided with the so-called "claspers," which are present as appendages to the posterior edges of the ventral fins; fecundation is effected by copulation. The branchial apertures are usually five in number, and are generally all external. There is no air bladder.

\*This character must be accepted with some modification; the ceratohyal of the representatives of the genus *Polyodon* has on each side an appendage which is evidently homologous to the branchiostegal rays of other fishes.

There are two orders in this sub-class, the *Plagiostomi* and the *Holocephali*, which may be briefly distinguished as follows :

#### Order *PLAGIOSTOMI* Dumeril.

There are almost always five external branchial apertures, the only exceptions occurring in the family of Notidanoids. In *Hexanchus* of Rafinesque, there are six, and in the *Heptranchius* of the same author, there are seven.

The Plagiostoms may be again divided into four suborders, the *Squali*, the *Rhinæ*, the *Pristes* and the *Raiæ*.

#### Suborder *SQUALI* Müller and Henle.

The *Squali* are distinguished by the lateral position of the branchial apertures, free supplementary eyelids, an incomplete scapular arch, and the absence of a naso-pectoral cartilage. The form is always more or less elongated and subcylindrical.

In the suborder, as now restricted, only the sharks are included. The *Rhinæ* or *Squatinae*, embraced in the group by Müller and Henle, may be considered as representing another suborder.

#### Suborder *RHINÆ* Gill.

This suborder is principally distinguished from the *Squali* by the depressed head and body, and the dorsal position of the eyes. As in the *Squali*, the branchial apertures are situated on the sides, but are placed in a furrow, which separates the large and anteriorly expanded pectoral fins from the body. The mouth is at the extremity of the snout.

This group contains only one genus represented by three species.

#### Suborder *PRISTES* Gill.

The *Pristes* have the elongated and subcylindrical bodies of the *Squali*, but the branchial apertures are open, as in the *Rays*, on the ventral surface of the breast. The snout is prolonged into a long, narrow and depressed dagger-like beak, which are provided with strong osseous spines or teeth on each side. The teeth of the jaws are flat and paped.

This suborder embraces living representatives of only one genus, which must be referred to a peculiar family, that of the *Pristoids*. It is represented by a single species on the American coast.

#### Suborder *RAIÆ* Müller and Henle.

The *RAIÆ* have the branchial apertures beneath the body under the pectoral fins and before the ventrals. The eyes and spout-holes are always on the dorsal aspect of the head; the scapular arch complete, and naso-pectoral cartilages present. There is no eyelid, or only an adnate upper one.

In this suborder, the *Rays* and allied fishes, with similar depressed bodies, are alone embraced.

Order *HOLOCEPHALI* Bon.

In the species of this order, there is only one branchial fissure on each side as in true fishes.

No representatives of the *Holocephali* have yet been detected on the Eastern American Coast.

Subclass *DERMOPTERI* Owen.

The fourth subclass may provisionally embrace both the Cyclostomi or Marsipobranchii and the Pharyngobranchii or Cirrhostomi. Thus enlarged, it corresponds to the *DERMOPTERI* of Owen, and may retain that name. The body is much elongated and either subcylindrical or compressed. The endoskeleton is very rudimentary and cartilaginous, and in the order of Pharyngobranchii, there is no distinct head. The pectoral and ventral fins are both absent. The skin is entirely naked and mucous, and the fins are only folds of the skin. There are no pancreas nor air-bladder. The olfactory organ and nostril are single.

There are two orders.

Order *HYPEROARTII*, (Bon.) Müll.

The body is invariably greatly elongated and subcylindrical, or anguilliform. The head is distinct. The myelon, or medulla spinalis, is described by Owen as being depressed and flattened, "of opaline subtransparency, ductile and elastic." The *bulbus arteriosus* is absent, but there are two opposite valves at the origin of the branchial vessel, as in the Teleostei. The branchiæ are purse-shaped and inoperculate; there are seven in number on each side. Each receives the streams of water for the aëration of the blood through short tubes, entering from a median canal which is below and distinct from the œsophagus, and which terminates behind in a closed wall, and, according to Professor Owen, communicates with the fauces anteriorly "by an opening guarded by a double membranous valve."

This order answers to the order of the same name of Müller, and the family of Petromyzontoids of the order Dermopteri of Owen. It embraces, on our coast, the "lampreys," or "lamper-eels" (Petromyzon).

Order *HYPEROTRETI*, (Bon.) Müller.

The representatives of this order resemble, in most respects, those of the *Hyperoartii*, chiefly differing in the respiratory apparatus. The branchiæ are bursiform and fixed, receiving the streams of water directly from the œsophagus through short tubes communicating with each sac. The water is discharged through tubes which either severally open externally, or into two lateral and longitudinal canals, directed backwards and discharging by as many orifices on each side of the median line of the ventral surface.



Order *PHARYNGOBRANCHII*, Müll.

The body is elongated and compressed, and there is no distinct head; the heart is also absent. The branchiæ are free, pharyngeal and inoperculate.

This group, embracing a single genus, the *Branchiostoma* of Costa, or *Amphioxus* of Yarrell, has been made by Müller the representative of a distinct subclass. Until its embryology is known, we may retain it among the Dermopteri.

A species of this genus was discovered by Dr. Stimpson and the author at Beaufort, North Carolina, in the spring of the present year.

For our knowledge of the anatomical characters of the preceding groups, we have been chiefly indebted to the labors of the learned Müller, and the great English anatomist, Owen.\* The classification here adopted resembles theirs more than any others. The classification of Professor Owen differs from that of Müller in not recognizing the existence of subclasses, and in the less relative value assigned to the Pharyngobranchii and Marsipobranchii. The present arrangement is, therefore, quite different from his, as we cannot consider the differences existing between the Physostomi, Pharyngognathi, Anacanthini and Acanthopteri as even approximating in value to those between the orders just named, and the Ganoids or Elasmobranchiates.

The relative standing and importance of the different subclasses of Fishes above recognized have been variously interpreted by naturalists. Some have placed the Elasmobranchii and Dermopteri near to each other, and by Professor Agassiz they were formerly united in one order, for which the name of Placoids was proposed. In the last classification of Professor Agassiz, the Elasmobranchial order called Selachians and the Marsipobranchial Dermopteri called Myzontes are regarded as belonging to different classes, between which the Ganoids and Fishes, which are also considered as classes, are interposed. Other naturalists have regarded those two subclasses as representing the opposite extremes of the class, and have placed the Elasmobranchii in the first rank and the Dermopteri lowest. Those different allocations have resulted from different points of view from which the groups have been examined. Those naturalists who have approximated the Elasmobranchii and Dermopteri were principally influenced by the cartilaginous condition of the skeleton; those who placed the Elasmobranchii in the highest rank looked to the special

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\* We have been especially under obligation to the invaluable "Lectures on the Comparative Anatomy and Physiology of the Vertebrate Animals, delivered at the Royal College of Surgeons of England in 1844 and 1846." The first part, devoted to the Fishes, is rich in information on the structure of those animals. It is the only one that has yet been published.

development of some of the systems, especially the nervous and generative. We will follow Cuvier, and the majority of ichthyologists, in placing next to each other the Dermopteri and Elasmobranchii, and then, in ascending order, will succeed the Ganoids and finally the Teleostei. The considerations which have led us to these results will be briefly stated.

Fishes appear to be constructed according to four different sub-plans, which are characterized by their correspondence to different stages or grades of development of a typical osseous fish. The types so distinguished are equivalent to the four subclasses here admitted. All the subclasses are constructed on the ichthyic modification of the vertebrated plan, but the archetype of each subclass corresponds, in a general manner, to different periods of development of that plan which have successively taken place.

A plan will admit of great modification or adaptation. Species constructed according to an inferior plan do not necessarily exhibit complexity of organization of less degree than those constructed on a higher *plan*. Species framed on inferior plans are capable of a high degree of organization consistent with the plan. The degree of development of the plan or type is the criterion of the station of a group; not the complexity of organization, or adaptation to peculiar habits or modes of life. Applying these principles to the relative classification of the different subclasses of Fishes, we have the following results.

The Dermopteri are the lowest in the scale; they represent an early stage of development of the archetype fish. The subclass exhibits no examples of complexity of organization, or specialization and development of any system or set of organs.

The type of structure of the Elasmobranchii is more perfected, and represents the development of the archetype fish arrested at a more advanced period. It still exhibits many embryonic characteristics, but on account of the complexity and high degree of development and adaptation of special systems or sets of organs, exhibits a high upward tendency.

The subclass of the Ganoids represents a still more advanced period of development, which is more remote from the germ of the embryo than that of either of the preceding. Representatives of this subclass also exhibit a high degree of special development of different systems, but this is of subordinate value to the plan or type of structure.

Finally, the sub-plan of the Teleostei represents the perfected idea of the ichthyic development of the vertebrated plan. For the sake of illustration, it may be said to exhibit the highest advance consistent with the preservation of the ichthyic type.

The conception of the sub-plans and the range of variation exhibited in each, may be represented by four vertical lines.

The Dermopteri are to be represented by a short line.

The Elasmobranchii may be represented by a much elongated line, commencing at a higher level than the line for the Dermopteri.

The Ganoidei also exhibit a high upward tendency, and an approxima-

tion towards the reptiles; the line by which their standing would be represented, commences at a higher level than the preceding, and although elongated, would be less long than that of the Elasmobranchii.

The Teleostei or true fishes would be represented by a line commencing higher up than any of the preceding, but the line itself would be less prolonged than those representative of the Elasmobranchii and Ganoidei, the range of variation being much less. There is no excessive development of any system or organ. The Teleosteans are typical fishes and evince no tendency to approach to the reptiles.

The principles above enunciated may be better understood by their application to other departments of the animal kingdom, or to the vegetable kingdom. The sequence in a descending order of the branches of the former kingdom, now almost universally adopted, is first, the Vertebrata; secondly, the Articulata; thirdly, the Mollusca; fourthly, the Radiata, and finally the Protozoa. It will be denied by no naturalist at the present day, that no regular and continuous chain or series is formed by those animals from the Protozoa to the Vertebrata. For although the Vertebrata, as a group, rank higher than the Articulata, and they above the Mollusca, and the Mollusca are superior to the Radiata, there are still representatives of each of those branches that evince a higher degree of intelligence and greater complexity of organization than some of the representatives of the branches which precede them. The Branchiostoma or Pharyngobranchii, for example, would be considered inferior to many of the higher Articulata, and to the higher Mollusca, especially those of the class of Cephalopods.

The lower orders of worms, and the representatives of the inferior classes of the branch of Articulates, are much inferior in complexity of organization to the higher Mollusks. The Bryozoa of the Molluscous branch would also by almost all naturalists be considered as of an inferior grade to the Echinoderms of the branch of Radiates. Many classes and orders of the animal kingdom will furnish similar illustrations; it is unnecessary to more than allude to them here, as instances will at once occur to the practised naturalist. It will suffice to point to the lower insects in comparison with the higher Crustaceans, and to the lower representatives of the latter class and the higher worms.

The divisions of plants which appear to correspond to the branches of the animal kingdom are the Phanerogams, the Acrogens and the Thallophytes. In the former branch, the sequence of the classes adopted by the botanists is that of Exogens, Gymnosperms and Endogens. But there are many Exogenous plants which afford examples of lower organization than Gymnosperms, or than many of the Endogens, or even than many of the Filicales\* among the branch of Acrogens.

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\* Are not the Ferns and their allies entitled to as high rank in their branch of Acrogens as are the Echinoderms, Acalephs and Polyphs in their branch of radiated animals? And do not the Acrogens as a branch include both the true Acrogens and the Anophytes?

These examples appear to be sufficient to demonstrate that it is the plan and not the speciality of structure or organization that indicates the rank of groups.

The number of species described in the Catalogue, nominally amounts to three hundred and ninety-four. It is probable that when the species are thoroughly investigated, the number will be considerably reduced, and that many now retained with hesitation as distinct, will be identified with previously known ones. Those species that are most doubtful have been indicated by an asterisk (\*) after the specific name. One or two, of which the genus is doubtful, has been pointed out by the same character placed after the generic part of the name of the species; when one has been introduced on doubtful authority as an inhabitant of the coast, the same is placed before the specific name. The describers of most of the doubtful "new species" were acquainted by description with those to which they are most nearly allied, and had, consequently, better sources of information than ourselves. We have, therefore, not deemed it in most instances proper to attempt a positive identification, when there was a reasonable doubt,—the object of this Catalogue being to present a complete view of the species that have been described. In some cases, descriptions of species have been very meagre, and no distinctions are mentioned by which they can be distinguished from others. In other instances, the descriptions have been very full and complete; but the species have been indicated with a doubt, either on account of the poverty of a former description of an allied species, or from inability to refer at present to the work in which the description occurs.

The Catalogue is only intended to embrace those species found on some portion of the eastern American coast, from Greenland or the Arctic regions to the State of Georgia. South of that, the West Indian Fauna commences, and quite a different association of forms and species occurs. At a future time, a catalogue of the West Indian fishes will be probably published.

In the preparation of the Catalogue, and the acceptance of both generic and specific names, we have been always guided by the law of priority, except when a palpable error would be perpetuated. It may not be apparent, from the list, by whom the species was originally described or named. In most cases, it will be discovered on reference to the works of Doctors Storer, Dekay, or Holbrook. In others, it has been found that species have been named by naturalists which have been unknown or not identified by those naturalists. Such instances we hope soon to be able to publish our observations on.

Many new genera have been introduced here for the first time. We have been compelled to this step in order not to mislead the student in regard to their generic affinities. Several well-known names have also been replaced by new ones, as the former had been already preoccupied

in other branches of natural history. In the latter case, we have always carefully investigated into the history of the first name or names, and only changed that of a genus when it has been ascertained that the former has been legitimately conferred on an older established group, and is entitled to priority. The characters of new genera, and the reason for changing the names of old ones, will be published in due time.

As we could not conveniently, except in very few cases, refer to more than one author in the synonymy, we have used the work of Dr. Storer on the Fishes of North America. In that compilation will be found references to other authors. The synonymy of a large proportion of our marine fishes has been collated; but it is not yet convenient to publish the results. When a species has not been noticed by Dr. Storer, reference has been made to the first author by whom it was indicated as a native of our waters.

The true popular names, when known, have been added after the specific name. We have not deemed it proper to invent "scientific popular" ones, as we see no advantage that can be gained by their introduction. They will never be used by the people at large, nor will they be recognized by naturalists. There is but one true name for a species, and by that name alone is it known to the scientific men of all countries. It is proper to warn the unscientific reader, that because he recognizes a name applied to a species, it is by no means certain that such a name indicates the same species in his own section of the country. There is no constancy nor rule in the application of vernacular names. The same designation may apply to fifty different species, and the same species may receive, in different parts of the country, fifty different names. It is, therefore, with much doubt that any species is to be identified from a similarity of the popular names alone. The names inserted are generally those by which the species are known at New York. Those by which some are designated at Charleston are also included.

The author, trusting that the present list may prove of some benefit to the student, and induce investigation among a class that has hitherto not received a due share of attention from the American naturalist, respectfully submits it to the public.

*Smithsonian Institution, Washington, D. C.*

## Subclass TELEOSTEI Muller.

## Order TELEOCEPHALI Gill.

## Suborder PHYSOCLYSTI (Bon.)

## Family PERCOIDÆ Cuv.

## Subfamily PERCINÆ Gill.

## Genus ROCCUS (Mitch.) Gill.

- ROCCUS LINEATUS *Gill.* "Rock Fish," "Striped Bass."  
*Labrax lineatus Storer.* Synopsis Fishes N. A., p. 21.

## Genus MORONE (Mitch.) Gill.

- MORONE AMERICANA *Gill.* "White Perch."  
*Labrax rufus (Dekay) Storer.* Synopsis Fishes N. A., p. 22.  
*Labrax pallidus (Dekay) Storer.* Loc. cit., p. 22.  
*Labrax nigricans (Dekay) Storer.* Loc. cit., p. 23.

## Subfamily SERRANINÆ (Sev.)

## Genus CENTROPRISTIS Cuv.

- CENTROPRISTIS ATRARIUS *Barneville.* "Sea Bass."  
*Centropristes atrarius Holbrook.* Ichthyology of South Carolina,  
 p. 42, pl. vii., fig. 2.  
 CENTROPRISTIS NIGRESCENS *Gill.* "Sea Bass."  
*Centropristes nigricans Storer.* Synopsis Fishes N. A., p. 35.

## Genus TRILOBURUS Gill.

- TRIOLOBURUS TRIFURCUS *Gill.*  
*Centropristes trifurca Storer.* Synopsis Fishes N. A., p. 35.

## Genus DIPECTRUM Holbrook.

- DIPECTRUM FASCICULARE *Holbrook.*  
*Serranus fascicularis Storer.* Synopsis Fishes N. A., p. 28.

## Genus EPINEPHELUS (Bloch.)

- EPINEPHELUS MORIO *Gill.*  
*Serranus morio Storer.* Synopsis Fishes N. A., p. 25.  
 EPINEPHELUS ERYTHROGASTER *Gill.*  
*Serranus erythrogaster Storer.* Synopsis Fishes N. A., p. 30.  
 EPINEPHELUS NIGRITUS *Gill.*  
*Serranus nigrinus Holbrook.* Ichthyology of South Carolina, p. 173,  
 pl. 25, fig. 2.  
 EPINEPHELUS OXYPTERUS *Gill.*  
*Corvina oxyptera (Dekay) Storer.* Synopsis Fishes N. A., p. 72.  
 EPINEPHELUS ACUTIROSTRIS *Gill.*  
*Serranus acutirostris Storer.* Synopsis Fishes N. A., p. 29.

## Subfamily DULINÆ Gill.

## Genus DULES Cuv.

DULES AURIGA *Cuv. and Val.* "Coachman."  
*Dules auriga Storer.* Synopsis Fishes N. A., p. 44.

## Subfamily RYPTICINÆ Gill.

## Genus PROMICROPTERUS Gill.

PROMICROPTERUS MACULATUS *Gill.* "Soap Fish."  
*Rypticus maculatus Holbrook.* Ichthyology of South Carolina,  
 p. 39, pl. 6, fig. 2.

## Family SPAROIDÆ Cuv.

## Subfamily SPARINÆ Bon.

## Genus SPARUS (Linn.) Bon.

SPARUS ACULEATUS *Gill.*  
*Chrysophrys aculeata Storer.* Synopsis Fishes N. A., p. 82.

## Genus PAGRUS Cuv.

PAGRUS ARGYROPS *Cuv.* "Porgee."  
*Pagrus argyrops Storer.* Synopsis Fishes N. A., p. 82.

## Genus SARGUS (Klein.)

SARGUS OVICEPHALUS *Gill.* "Sheep's-head."  
*Sargus ovis Storer.* Synopsis Fishes N. A., p. 80.

SARGUS ARENOSUS *DeKay.*  
*Sargus arenosus Storer.* Synopsis Fishes N. A., p. 81.

## Genus LAGODON Holbrook.

LAGODON RHOMBOIDES *Holbrook.*  
*Sargus rhomboides Storer.* Synopsis Fishes N. A., p. 81.

## Family PIMELEPTEROIDÆ Gill.

## Subfamily PIMELEPTERINÆ Bon.

## Genus PIMELEPTERUS Lac.

PIMELEPTERUS BOSCH *Lac.*  
*Pimelepterus Boschii Storer.* Synopsis Fishes N. A., p. 89.

## Family MÆNROIDÆ Cuv.

## Subfamily MÆNINÆ Bon.

## Genus EUCINOSTOMUS Baird and Girard.

EUCINOSTOMUS ARGENTEUS *Baird and Girard.*  
*Eucinostomus argenteus Baird and Girard.* Ninth Annual Report  
 Smith. Inst., p. 345.

## Genus GERRES Cuv.

GERRES APRION\* *Cuv. and Val.*  
*Gerres aprion Storer.* Synopsis Fishes N. A., p. 84.

## Family ZENOIDÆ (Lowe.)

## Subfamily ZENINÆ Gill.

## Genus ZEUS Linn.

ZEUS OCELLATUS *Storer.**Zeus ocellatus Storer.* Proc. Boston Soc. Nat. Hist.

## Family PRISTIPOMATOIDÆ Gill.

## Subfamily PRISTIPOMATINÆ Gill.

## Genus ANISOTREMUS Gill.

ANISOTREMUS VIRGINICUS *Gill.**Pristipoma rodo Storer.* Synopsis Fishes N. A., p. 76.

## Genus ORTHOPRISTIS Girard.

ORTHOPRISTIS FULVO-MACULATUS *Gill.**Hamulon fulvo-maculatum Storer.* Synopsis Fishes N. A., p. 76.

## Genus HÆMULON Cuv.

HÆMULON ARCUATUM *Cuv. and Val.* "Grunts."*Hæmulon arcuatum Storer.* Synopsis Fishes N. A., p. 76.HÆMULON FORMOSUM *Cuv.**Hæmulon formosum Storer.* Synopsis Fishes N. A., p. 73.HÆMULON CHRYSOPTERON *Cuv.**Hæmulon chrysopteron Storer.* Synopsis Fishes N. A., p. 74.

## Subfamily LOBOTINÆ Gill.

## Genus NEOMENIS Girard.

NEOMENIS EMARGINATUS *Girard.**Lobotes emarginatus Baird and Girard.* Ninth Annual Report  
Smith. Inst., p. 332.

## Genus LOBOTES Cuv.

LOBOTES SURINAMENSIS *Cuv.**Lobotes surinamensis Storer.* Synopsis Fishes N. A., p. 78.

## Family SCLÆNOIDÆ (Cuv.)

## Subfamily SCLÆNINÆ (Bon.)

## Genus OTOLITHUS Cuv.

OTOLITHUS REGALIS *Cuv.* "Weak Fish."*Otolithus regalis Storer.* Synopsis Fishes N. A., p. 66.OTOLITHUS CAROLINIENSIS *Cuv. and Val.**Otolithus caroliniensis Storer.* Synopsis Fishes N. A., p. 66.OTOLITHUS THALASSINUS *Holbrook.**Otolithus thalassinus Holbrook.* Ichthyology of South Carolina,  
p. 132, pl. xviii., fig. 2.OTOLITHUS NOTHUS *Holbrook.**Otolithus nothus Holbrook.* Ichthyology of South Carolina, p. 134,  
pl. xix., fig. 1.



## Genus JOHNIUS Bloch.

- JOHNIUS OCELLATUS *Girard*. "Red Fish."  
*Corvina ocellata Storer*. Synopsis Fishes N. A., p. 67.

## Genus BAIRDIELLA Gill.

- BAIRDIELLA ARGYROLEUCA *Gill*. "White Perch."  
*Corvina argyroleuca Storer*. Synopsis Fishes N. A., p. 105.

## Genus HOMOPRION Holbrook.

- HOMOPRION SUBTRUNCATUS *Gill*.  
*Leiostomus xanthurus Storer*. Synopsis Fishes N. A., p. 69.  
 HOMOPRION LANCEOLATUS *Holbrook*.  
*Homoprion lanceolatus Holbrook*. Ichthyology of South Carolina,  
 p. 168, pl. xxiii., fig. 1.

## Genus LIOSTOMUS Lacepede.

- LIOSTOMUS XANTHURUS *Lacepede*. "Lafayette."  
*Leiostomus obliquus Storer*. Synopsis Fishes N. A., p. 69.

## Genus UMBRINA Cuv.

- UMBRINA ALBURNUS *Holbrook*. "King Fish."  
*Umbrina alburnus Holbrook*. Ichthyology of South Carolina,  
 Georgia and Florida, p. 3, pl. i., fig. 1.  
 UMBRINA NEBULOSA *Cuv*.  
*Umbrina alburnus Storer*. Synopsis Fishes N. A., p. 71.  
 UMBRINA LITTORALIS *Holbrook*.  
*Umbrina littoralis Holbrook*. Ichthyology of South Carolina,  
 Georgia and Florida, p. 10, pl. i., fig. 2.

## Genus MICROPOGON Cuv.

- MICROPOGON COSTATUS *Cuv*.  
*Micropogon costatus Storer*. Synopsis Fishes N. A., p. 73.  
 MICROPOGON UNDULATUS *Cuv, and Val*.  
*Micropogon undulatus Storer*. Synopsis Fishes N. A., p. 73.

## Genus POGONIAS Lac.

- POGONIAS CHROMIS *Lac*. "Drum."  
*Pogonias chromis Storer*. Synopsis Fishes N. A., p. 72.  
 POGONIAS FASCIATUS *Cuv, and Val*.  
*Pogonias fasciatus Storer*. Synopsis Fishes N. A., p. 72.

## Subfamily LARIMINÆ Gill.

## Genus LARIMUS Cuv.

- LARIMUS FASCIATUS *Holbrook*.  
*Larimus fasciatus Holbrook*. Ichthyology of South Carolina,  
 p. 153, pl. xxii., fig. 1.

## Family CHÆTODONTOIDÆ Bon.

## Subfamily CHÆTODONTINÆ (Bon.) Gill.

## Genus HOLACANTHUS Lac.

HOLACANTHUS CILIARIS *Lac.* "Angel Fish."Holacanthus ciliaris *Storer.* Synopsis Fishes N. A., p. 87.

## Subfamily EPHIPPIINÆ Gill.

## Genus EPHIPPUS Cuv.

EPHIPPUS FABER *Cuv.*Ephippus faber *Storer.* Synopsis Fishes N. A., p. 87.EPHIPPUS GIGAS *Cuv.*Ephippus gigas *Storer.* Synopsis Fishes N. A., p. 87.

## Family TEUTHIDOIDÆ (Bon.)

## Subfamily TEUTHIINÆ (Bon.)

## Genus ACANTHURUS (Forsk.)

ACANTHURUS PHEBOTOMUS *Bloch.* "Surgeon."Acanthurus phebotomus *Storer.* Synopsis Fishes N. A., p. 111.ACANTHURUS CERULEUS *Bloch.*Acanthurus ceruleus *Storer.* Synopsis Fishes N. A., p. 112.

## Family CAMPYLODONTOIDÆ Gill.

## Subfamily CAMPYLODONTINÆ Gill.

## Genus CAMPYLODON Fabricius.

CAMPYLODON FABRICII *Reinhardt.*Notacanthus nasus *Storer.* Synopsis Fishes N. A., p. 100.

## Family BRAMOIDÆ Lowe.

## Subfamily CENTROLOPHINÆ Gill.

## Genus PALINURICHTHYS Gill.

PALINURICHTHYS PERCIFORMIS *Gill.*Palinurus perciformis *Storer.* Synopsis Fishes N. A., p. 99.

## Subfamily PTERACLINÆ Swainson.

## Genus PTERACLIS Gronovius.

PTERACLIS CAROLINUS *Val.*Pteraclis carolinus *Storer.* Synopsis Fishes N. A., p. 109.

## Family CORYPHÆNOIDÆ (Lowe.)

## Subfamily CORYPHÆNINÆ Bon.

## Genus CORYPHÆNA Linn.

CORYPHÆNA LESUERII *Val.* "Dolphin."Coryphæna Lesuerii *Storer.* Synopsis Fishes N. A., p. 107.CORYPHÆNA GLOBICEPS *Dekay.\**Coryphæna globiceps *Storer.* Synopsis Fishes N. A., p. 107.

## Genus CARANXOMORUS\* Lac.

CARANXOMORUS PUNCTULATUS\* *Gill.**Lampugus punctulatus Storer.* Synopsis Fishes N. A., p. 108.Subfamily PEPRILINÆ *Gill.*Genus PEPRILUS *Cuv.*PEPRILUS LONGIPINNIS *Gill.* "Rudder Fish."*Rhombus longipinnis Storer.* Synopsis Fishes N. A., p. 109.Genus PORONOTUS *Gill.*PORONOTUS TRIACANTHUS *Gill.* "Harvest Fish."*Rhombus triacanthus Storer.* Synopsis Fishes N. A., p. 110.Family LEPTUROIDÆ *Gill.*Subfamily LEPTURINÆ *Gill.*Genus LEPTURUS (*Artedi*) *Linn.*LEPTURUS ARGENTUS *Gill.* "Ribbon Fish."*Trichiurus lepturus Storer.* Synopsis Fishes N. A., p. 94.Family SPHYRÆNOIDÆ (*Bon.*)Subfamily SPHYRÆNINÆ (*Bon.*)Genus SPHYRÆNA *Linn.*SPHYRÆNA BOREALIS *Dekay.* "Barracuda."*Sphyræna borealis Storer.* Synopsis Fishes N. A., p. 48.Family SCOMBROIDÆ (*Cuv.*)Subfamily SCOMBRINÆ (*Bon.*)Genus SCOMBER (*Linn.*)SCOMBER VERNALIS *Mitchill.* "Spring Mackerel."*Scomber vernalis Storer.* Synopsis Fishes N. A., p. 90.SCOMBER GREX *Mitchill.\** "Fall Mackerel."*Scomber grex Storer.* Synopsis Fishes N. A., p. 90.SCOMBER DEKAYI *Storer.**Scomber colias Storer.* Synopsis Fishes N. A., p. 89.Subfamily ORYCNINÆ *Gill.*Genus ORYCNUS *Cuv.*ORYCNUS SECUNDI-DORSALIS *Gill.* "Tunny."*Thynnus vulgaris Storer.* Synopsis Fishes N. A., p. 91.Genus PELAMYS *Cuv.*PELAMYS SARDA *Cuv.* "Bonito."*Pelamys sarda Storer.* Synopsis Fishes N. A., p. 91.Genus APODONTIS *Bennett.*APODONTIS MACULATUS *Gill.* "Spanish Mackerel."*Cybium maculatum Storer.* Synopsis Fishes N. A., p. 92.

## Subfamily CARANGINÆ (Bon.)

## Genus CARANGUS Cuv.

- CARANGUS ESCULENTUS *Girard*.  
 Caranx carangus *Storer*. Synopsis Fishes N. A., p. 101.
- CARANGUS HIPPOS *Gill*. "Golden Mackerel."  
 Caranx chrysos *Storer*. Synopsis Fishes N. A., p. 101.
- CARANGUS DEFENSOR *Girard*.  
 Caranx defensor *Storer*. Synopsis Fishes N. A., p. 102.
- CARANGUS RICHARDI *Girard*.  
 Caranx Richardi *Holbrook*. Fishes of South Carolina.
- CARANGUS FALCATUS *Girard*.  
 Caranx falcatus *Holbrook*. Fishes of South Carolina.

## Genus DECAPTERUS Bleeker.

- DECAPTERUS\* PUNCTATUS *Gill*.  
 Caranx punctatus *Storer*. Synopsis Fishes N. A., p. 101.

## Genus BLEPHARICHTHYS Gill.

- BLEPHARICHTHYS CRINITUS *Gill*. "Shoemaker."  
 Blepharis crinitus *Storer*. Synopsis Fishes N. A., p. 103.

## Genus ARGYREIOSUS Lac.

- ARGYREIOSUS VOMER *Lac*.  
 Argyreiosus vomer *Storer*. Synopsis Fishes N. A., p. 104.
- ARGYREIOSUS CAPILLARIS *Dekay*. "Hair-finned Dory."  
 Argyreiosus capillaris *Storer*. Synopsis Fishes N. A., p. 104.
- ARGYREIOSUS UNIMACULATUS *Batchelder*.  
 Argyreiosus unimaculatus *Storer*. Synopsis Fishes N. A., p. 271.

## Genus SELENE Lac.

- SELENE ARGENTEA *Lac*.  
 Selene argentea *Brevoort*. Annals Lyceum Nat. Hist. N. Y.,  
 vol. v., p. 68, pl. iv.

## Genus VOMER Cuv.

- VOMER SETIPINNIS *Ayres*.  
 Vomer Brownii *Storer*. Synopsis Fishes N. A., p. 105.

## Subfamily SERIOLINÆ Gill.

## Genus ZONICHTHYS Swainson.

- ZONICHTHYS ZONATUS *Gill*.  
 Seriola zonata *Storer*. Synopsis Fishes N. A., p. 105.
- ZONICHTHYS BOSCHII *Gill*.  
 Seriola Boschii *Storer*. Synopsis Fishes N. A., p. 105.
- ZONICHTHYS FASCIATUS *Swainson*.  
 Seriola fasciata *Storer*. Synopsis Fishes N. A., p. 105.
- ZONICHTHYS LEIARCHUS *Gill*.  
 Seriola leiarchus *Storer*. Synopsis Fishes N. A., p. 106.
- ZONICHTHYS CAROLINENSIS *Gill*.  
 Seriola carolinensis *Storer*. Synopsis Fishes N. A., p. 106.

## Genus CHLOROSCOMBRUS Girard.

CHLOROSCOMBRUS COSMOPOLITUS *Girard.**Seriola cosmopolita* *Storer.* Synopsis Fishes N. A., p. 106.

## Genus POMATOMUS Lac.

POMATOMUS SALLATRIX *Gill.* "Blue Fish;" Skip-jack."*Temnodon saltator* *Storer.* Synopsis Fishes N. A., p. 103.

## Subfamily TRACHYNOTINÆ Gill.

## Genus TRACHYNOTUS Lac.

TRACHYNOTUS ARGENTEUS *Cuv. and Val.**Trachinotus argenteus* *Storer.* Synopsis Fishes N. A., p. 93.

## Genus DOLIODON Girard.

DOLIODON SPINOSUS *Girard.* "Spinous Dory."*Trachinotus spinosus* *Storer.* Synopsis Fishes N. A., p. 93.DOLIODON CAROLINUS *Girard.**Lichia carolina* *Storer.* Synopsis Fishes N. A., p. 96.

## Genus BOTHROLEMUS Holbrook.

BOTHROLEMUS PAMPANUS *Holbrook.**Trachinotus pampanus* *Storer.* Synopsis Fishes N. A., p. 99.

## Subfamily CENTRONOTINÆ (Bon.)

## Genus NAUCRATES Raf.

NAUCRATES DUCTOR *Cuv.* "Pilot Fish."*Naucrates ductor* *Storer.* Synopsis Fishes N. A., p. 96.NAUCRATES NOVEBORACENSIS *Val.* "Pilot Fish."*Naucrates noveboracensis* *Storer.* Synopsis Fishes N. A., p. 96.

## Subfamily ELACATINÆ Gill.

Genus ELACATES *Cuv.*ELACATES NIGER *Gill.* "Crab-eater."*Elacates atlanticus* *Storer.* Synopsis Fishes N. A., p. 111.

## Family ECHENIDOIDÆ (Bon.)

## Subfamily ECHENIDEINÆ.

## Genus ECHENEIS Linn.

ECHENEIS REMORA *Linn.* "Remora."*Echeneis remora* *Storer.* Synopsis Fishes N. A., p. 232.ECHENEIS BRACHYPTERA *Lowe.\***Echeneis quatuordecim-laminatus* *Storer.* Synopsis Fishes N. A., p. 282.ECHENEIS ALBICAUDA *Mitchill.**Echeneis albicauda* *Storer.* Synopsis Fishes N. A., p. 231.*Echeneis lineata* *Holbrook.\** Ichthyology of South Carolina, p. 101, pl. xiv., fig. 2.*Echeneis Holbrookii\** *Günther.* Annals and Magazine of Nat. Hist., ser. iii., vol. v., p. 400.ECHENEIS NAUCRATES *Linn.**Echeneis naucrates* *Storer.* Synopsis Fishes N. A., p. 232.

## Family XIPHIIDÆ (Bon.)

## Subfamily XIPHIINÆ Gill.

## Genus XIPHIAS Linn.

XIPHIAS GLADIUS *Linn.* "Sword Fish."*Xiphias gladius Storer.* Synopsis Fishes N. A., p. 95.

## Family SCOMBERESOCOIDÆ Rich.

## Subfamily SCOMBERESOCINÆ Gill.

## Genus SCOMBERESOX Lac.

SCOMBERESOX SCUTELLATUS (*Les.*) "Bill Fish."*Scomberesox Storeri Storer.* Synopsis Fishes N. A., p. 187.

## Subfamily BELONINÆ (Bon.)

## Genus BELONE Cuv.

BELONE LONGIROSTRIS *Gill.* "Bill Fish," "Gar Fish."*Belone truncata Storer.* Synopsis Fishes N. A., p. 186.

## Family EXOCETOIDÆ Gill.

## Subfamily EXOCETINÆ (Bon.)

## Genus EXOCÆTUS Linn.

EXOCÆTUS EXILIENS *Gmelin.* "Flying Fish."*Exocætus exiliens Storer.* Synopsis Fishes N. A., p. 189.EXOCÆTUS NOVEBORACENSIS *Mitchill.**Exocætus noveboracensis Storer.* Synopsis Fishes N. A., p. 188.EXOCÆTUS MELANURUS *Val.**Exocætus melanurus Cuv. et Val.* Hist. Nat. des Poissons, vol. xix. p. 100.Genus HALOCYPSELUS *Weinland.*HALOCYPSELUS EVOLANS *Gill.* "Flying Fish."*Exocætus evolans Cuv. et Val.* Hist. Nat. des Poissons, vol. xix. p. 138.Genus CYPSELURUS *Swainson.*CYPSELURUS COMATUS *Weinland.* "Bearded Flying Fish."*Exocætus comatus Storer.* Synopsis Fishes N. A., p. 188.CYPSELURUS FURCATUS *Weinland.**Exocætus furcatus Storer.* Synopsis Fishes N. A., p. 188.

## Family AULOSTOMATOIDÆ Gill.

## Subfamily SOLENOSTOMINÆ Gill.

Genus SOLENOSTOMUS *Gronovius.*SOLENOSTOMUS TABACARIUS *Gill.* "Pipe Fish."*Fistularia tabacaria Storer.* Synopsis Fishes N. A., p. 191.SOLENOSTOMUS SERRATUS *Gill.**Fistularia serrata Storer.* Synopsis Fishes N. A., p. 191.

## Family CENTRISCOIDÆ Gill.

## Subfamily CENTRISCINÆ Gill.

## Genus CENTRISCUS Linn.

CENTRISCUS SCOLOPAX *Linn.\**

*Centriscus scolopax* *Storer*. Proc. Boston Society of Nat. Hist.,  
vol. vi. p. 178.

## Family GASTEROSTEOIDÆ (Bon.)

## Subfamily GASTEROSTEINÆ (Bon.)

## Genus GASTEROSTEUS (Linn.)

GASTEROSTEUS ACULEATUS *Linn.* "Stickleback."

*Gasterosteus trachurus* *Storer*. Synopsis Fishes N. A., p. 62.

GASTEROSTEUS ACULEATUS *Linn.*, var. *dimidiatus* *Reinhardt*.

*Gasterosteus aculeatus* *Fabricius*, Fauna Groenlandica, No. 122.

*Gasterosteus dimidiatus* *Reinhardt*, Kongelige Danske Videnskaber-  
nes Selskabs Nat. og. Math. Afh., vol. vii. p. 114.

GASTEROSTEUS ACULEATUS *Linn.*, var. *loricatus* *Reinhardt*.

*Gasterosteus loricatus* *Reinhardt*, Kongelige Danske Videnskaber-  
nes Selskabs Nat. og. Math. Afh., vol. vii. pp. 114, 119.

GASTEROSTEUS ACULEATUS *Linn.*, var. *gymnurus* *Reinhardt*.

*Gasterosteus gymnurus* *Reinhardt*, Kongelige Danske Videnska-  
bernes Selskabs Nat. og. Math. Afh., vol. vii. p. 193.

GASTEROSTEUS NOVEBORACENSIS *Cuv. and Val.*

*Gasterosteus noveboracensis* *Storer*. Synopsis Fishes N. A., p.  
63.

GASTEROSTEUS BIACULEATUS *Mitchill*.

*Gasterosteus biaculeatus* *Storer*. Synopsis Fishes N. A., p. 63.

GASTEROSTEUS NIGER *Cuv. and Val.*

*Gasterosteus niger* *Storer*. Synopsis Fishes N. A., p. 63.

## Genus PYGOSTEUS Brevoort, Mss.

PYGOSTEUS OCCIDENTALIS *Brevoort*.

*Gasterosteus occidentalis* *Cuv. et Val.* Hist. Nat. des Poissons,  
vol. iv. p. 509.

PYGOSTEUS DEKAYI *Brevoort*.

*Gasterosteus occidentalis* *Dekay*. Zoology of New York: Fishes,  
p. 68, pl. xlii. fig. 135.

PYGOSTEUS CUVIERI\* *Brevoort*.

*Gasterosteus Cuvieri* *Girard*. Boston Journal of Nat. Hist., vol.  
vi. p. 254.

## Genus APELTES (Dekay) Brevoort.

APELTES QUADRACUS *Brevoort*.

*Gasterosteus quadracus* *Storer*. Synopsis Fishes N. A., p. 63.

APELTES MILLEPUNCTATUS *Brevoort.\**

*Gasterosteus millepunctatus* *Storer*. Synopsis Fishes N. A., p. 64.

## Family POLYNEMATOIDÆ Gill.

## Subfamily POLYNEMATINÆ Gill.

## Genus TRICHIDION Klein.

TRICHIDION PLUMIERI *Gill.* "Thread Fish."Polynemus Americanus *Storer.* Synopsis Fishes N. A., p. 48.

## Family MUGILOIDÆ Richardson.

## Subfamily MUGILINÆ (Bon.)

## Genus MUGIL Linn.

MUGIL ALBULA *Linn.* "Mullet."Mugil albula *Storer.* Synopsis Fishes N. A., p. 115.MUGIL LINEATUS *Mitchill.* "Mullet."Mugil lineatus *Storer.* Synopsis Fishes N. A., p. 115.MUGIL PETROSUS *Val.*Mugil petrosus *Storer.* Synopsis Fishes N. A., p. 115.MUGIL PLUMIERI *Val.*Mugil Plumieri *Storer.* Synopsis Fishes N. A., p. 116.

## Family ATHERINOIDÆ (Bon.)

## Subfamily ATHERININÆ (Bon.)

## Genus ARGYREA Dekay.

ARGYREA NOTATA *Gill.* "Silver-side."Atherina notata *Storer.* Synopsis Fishes N. A., p. 114.ARGYREA MENIDIA *Gill.*Atherina menidia *Storer.* Synopsis Fishes N. A., p. 114.

## Genus ATHERINA (Linn.)

ATHERINA CAROLINA *Val.* "Silver-side," "Sand Smelt."Atherina carolina *Storer.* Synopsis Fishes N. A., p. 114.

## Family AMMODYTOIDÆ Gill.

## Subfamily AMMODYTINÆ (Bon.)

## Genus AMMODYTES Linn.

AMMODYTES AMERICANUS *Dekay.*Ammodytes americanus *Storer.* Synopsis Fishes N. A., p. 237.AMMODYTES DUBIUS *Reinhardt.\**Ammodytes tobianus *Fabricius.* Fauna Grœnlandica, p. 140, No. 98.

## Subfamily ARGYROTÆNINÆ Gill.

## Genus ARGYROTÆNIA Gill.

ARGYROTÆNIA VITTATA *Gill.*Ammodytes vittatus *Storer.* Synopsis Fishes N. A., p. 238.



## Family PRIACANTHOIDÆ Gill.

## Subfamily PRIACANTHINÆ Gill.

## Genus PRIACANTHUS Cuv.

PRIACANTHUS MACROPHthalmus Cuv. "Big-eye."

## Family BERYCOIDÆ (Lowe.)

## Subfamily HOLOCENTRINÆ (Bon.)

## Genus HOLOCENTRUM Artedi.

HOLOCENTRUM SOGHO (Bloch.)

Holocentrum longipinne Storer. Synopsis Fishes N. A., p. 46.

## Family SCORPÆNOIDÆ (Sw.)

## Subfamily SCORPÆNINÆ (Bon.)

## Genus SCORPÆNA Linn.

SCORPÆNA PORCUS Linn.\*

Scorpæna porcus Storer. Synopsis Fishes N. A., p. 59.

SCORPÆNA BUFO Cuv.\*

Scorpæna bufo Storer. Synopsis Fishes N. A., p. 59.

## Genus SEBASTES Cuv.

SEBASTES NORVEGICUS Cuv.

Sebastes norvegicus Storer. Synopsis Fishes N. A., p. 59.

SEBASTES FASCIATUS Storer.

Sebastes fasciatus Storer. Proc. Boston Society of Nat. Hist.,  
vol. v., p. 31.

## Family COTTOIDÆ Rich.

## Subfamily COTTINÆ (Bon.)

## Genus ACANTHOCOTTUS (Girard.)

ACANTHOCOTTUS GRÆNLANDICUS Girard. "Sculpin."

Cottus grœnlandicus Storer. Synopsis Fishes N. A., p. 53.

ACANTHOCOTTUS LABRADORICUS Girard.\* "Sculpin."

Acanthocottus labradoricus Girard. Boston Journal of Nat.  
Hist., vol. vi., p. 248.

ACANTHOCOTTUS MUCOSUS Ayres.\* "Sculpin."

Acanthocottus mucosus Ayres.

ACANTHOCOTTUS VARIABILIS Ayres.\* "Sculpin."

Cottus variabilis Ayres. Boston Journal of Nat. Hist., vol. iv.,  
p. 259.

ACANTHOCOTTUS ÆNEUS Girard. "Sculpin."

Cottus æneus Storer. Synopsis Fishes N. A., p. 54.

ACANTHOCOTTUS OCTODECIM-SPINOSUS Gill. "Sculpin."

Cottus virginicanus Storer. Synopsis Fishes N. A., p. 53.

ACANTHOCOTTUS MITCHILLI Girard. "Sculpin."

Cottus Mitchilli Storer. Synopsis Fishes N. A., p. 56.

ACANTHOCOTTUS\* SCORPIOIDES *Girard*. "Sculpin."

*Cottus scorpioides Storer*. Synopsis Fishes N. A., p. 54.

ACANTHOCOTTUS OCELLATUS *H. R. Storer*.

*Acanthocottus ocellatus H. R. Storer*. Boston Journal of Nat. Hist., vol. vi., p. 253.

ACANTHOCOTTUS GLACIALIS *Gill*.

*Cottus glacialis Richardson*, in Last of the Arctic Voyages, p. 349, pl. xxiv.

ACANTHOCOTTUS POROSUS *Girard*.

*Cottus porosus Storer*. Synopsis Fishes N. A., p. 56.

#### Genus GYMNACANTHUS Swainson.

GYMNACANTHUS PATRIS *Gill*.

*Acanthocottus patris H. R. Storer*. Boston Journal of Nat. Hist., vol. vi., p. 250, pl. vii., fig. 2.

#### Genus ———

COTTUS POLARIS *Sabine*.

*Cottus polaris Storer*. Synopsis Fishes N. A., p. 55.

#### Genus ONCHOCOTTUS Gill.

ONCHOCOTTUS QUADRICORNIS *Gill*.

*Cottus hexacornis Storer*. Synopsis Fishes N. A., p. 55.

#### Genus PHOBETOR Kroyer.

PHOBETOR TRICUSPIS *Kroyer*.

*Cottus gobio Fabricius*. Fauna Grœnlandica, No. 115.

#### Genus ICELUS Kroyer.

ICELUS UNCINATUS *Kroyer*.

*Cottus uncinatus Reinhardt*. Kongelige Danske Videnskabernes Selskabs Nat. og. Math. Afh., vol. viii., p. viii.

ICELUS BICORNIS *Kroyer*.

*Cottus bicornis Reinhardt*. Kongelige Danske Videnskabernes Selskabs Nat. og. Math. Afh., vol. viii., p. 75.

#### Genus TRIGLOPS Reinhardt.

TRIGLOPS PINGELII *Reinhardt*.

*Triglops pingelii Reinhardt*. Kongelige Danske Videnskabernes Selskabs Nat. og. Math. Afh., vol. v., p. 52.

#### Genus HEMITRIPTERUS Cuv.

HEMITRIPTERUS ACADIANUS *Storer*.

*Hemitripterus americanus Storer*. Synopsis Fishes N. A., p. 58.

### Family AGONOIDÆ (Sw.)

#### Subfamily AGONINÆ Gill.

#### Genus AGONUS Bloch.

AGONUS CATAPHRACTUS *Bloch*.

*Aspidophorus europæus Storer*. Synopsis Fishes N. A., p. 57.

AGONUS SPINOSISSIMUS *Gill.*

*Aspidophorus spinosissimus Kroyer.* Naturhistorisk Tidsskrift, ser. ii., vol. i., p. 250.

Genus ASPIDOPHOROIDES Lac.

ASPIDOPHOROIDES MONOPTERYGIUS *Storer.*

*Aspidophorus monopterygius Storer.* Synopsis Fishes N. A., p. 57.

Family TRIGLOIDÆ (Bon.)

Subfamily TRIGLINÆ (Bon.)

Genus TRIGLA Linn.

TRIGLA CUCULUS *Linn.\**

*Trigla cuculus Storer.* Synopsis Fishes N. A., p. 50.

Genus PRIONOTUS Lac.

PRIONOTUS LINEATUS *DeKay.* "Flying Fish."

*Prionotus lineatus Storer.* Synopsis Fishes N. A., p. 50.

PRIONOTUS CAROLINUS *Cuv. and Val.*

*Prionotus carolinus Storer.* Synopsis Fishes N. A., p. 51.

PRIONOTUS PILATUS *Storer.*

*Prionotus pilatus Storer.* Proc. Boston Society of Nat. Hist. vol. ii., p. 77.

PRIONOTUS PUNCTATUS *Cuv. and Val.*

*Prionotus punctatus Storer.* Synopsis Fishes N. A., p. 51.

PRIONOTUS TRIBULUS *Cuv. and Val.*

*Prionotus tribulus Storer.* Synopsis Fishes N. A., p. 51.

Subfamily DACTYLOPTERINÆ Lac.

Genus DACTYLOPTERUS Lac.

DACTYLOPTERUS VOLITANS *Lac.\** "Flying Fish."

*Dactylopterus volitans Storer.* Synopsis Fishes N. A., p. 52.

Family URANOSCOPOIDÆ (Rich.)

Subfamily URANOSCOPINÆ (Bon.)

Genus ASTROSCOPUS Brev.

ASTROSCOPUS ANOPLUS *Brev.* "Stay-gazer."

*Uranoscopus anoplas Storer.* Synopsis Fishes N. A., p. 46.

ASTROSCOPUS GUTTATUS *Abbott.\**

*Astrosopus guttatus Abbott.* Proceedings of the Acad. of Nat. Sciences of Philadelphia, 1860, pl. 7.

Family BATRAHOIDÆ (Rich.)

Subfamily BATRACHINÆ (Bon.)

Genus BATRACHUS Linn.

BATRACHUS TAU *Linn.* "Toad Fish," "Oyster Fish."

*Batrachus tau Storer.* Synopsis Fishes N. A., p. 132.

BATRACHUS VARIEGATUS *Val.\**

*Batrachus variegatus Storer.* Synopsis Fishes N. A., p. 133.

BATRACHUS CELATUS *DeKay.\**

*Batrachus celatus Storer.* Synopsis Fishes N. A., p. 133.

## Family GOBIOIDÆ (Bon.)

## Subfamily GOBINÆ (Bon.)

## Genus GOBIOSOMA Girard.

GOBIOSOMA ALEPIDOTUM *Girard*. "Goby."*Gobius alepidotus Storer*. Synopsis Fishes N. A., p. 125.

## Subfamily ELEOTRIDINÆ Ag.

## Genus DORMITATOR Gill.

DORMITATOR SOMNULENTUS *Gill*.*Eleotris somnulentus Girard*. Ichthyology of United States and Mexican Boundary Survey, p. 28, pl. xii. figs. 1—3.

## Family BLENNIOIDÆ (Bon.)

## Subfamily BLENNINÆ (Bon.)

## Genus BLENNIUS Linn.

BLENNIUS\* FUCORUM *Cuv. and Val.\** "Blenny."*Blennius fucorum Storer*. Synopsis Fishes N. A., p. 117.BLENNIUS\* GEMINATUS *Wood*.*Blennius geminatus Storer*. Synopsis Fishes N. Y., p. 117.

## Genus HYPLEUROCHILUS Gill.

HYPLEUROCHILUS MULTIFILIS *Gill*.*Blennius multifilis Girard*. Ichthyology of United States and Mexican Boundary Survey, p. 27, pl. xii. fig. 6.HYPLEUROCHILUS\* PUNCTATUS *Gill*.*Blennius punctatus Storer*. Synopsis Fishes N. A., p. 117.

## Genus HYSOBLIENIUS Gill.

HYSOBLIENIUS HENTZI *Gill*.*Blennius Hentz Lesueur*. Journal of Acad. Nat. Sciences of Phila., vol. iv. p. 363.

## Genus CHASMODES Cuv. and Val.

CHASMODES BOSQUIANUS *Cuv. and Val.**Chasmodes Bosquianus Storer*. Synopsis Fishes N. A., p. 118.CHASMODES QUADRIFASCIATUS *Val.**Chasmodes quadrifasciatus Storer*. Synopsis Fishes N. A., p. 119.CHASMODES NOVEMLINEATUS *Val.**Chasmodes novemlineatus Storer*. Synopsis Fishes N. A., p. 119.

## Genus PHOLIS Artedi.

PHOLIS CAROLINUS *Val.**Pholis carolinus Storer*. Synopsis Fishes N. A., p. 118.

## Genus LEPTOBLIENIUS Gill.

LEPTOBLIENIUS SERPENTINUS *Gill*.*Blennius serpentinus Storer*. Proc. Boston Soc. of Nat. Hist., vol. iii. p. 30.

## Genus MURÆNOIDES Lac.

- MURÆNOIDES AFFINIS *Gill*. "Butter Fish."  
*Gunnellus affinis Reinhardt*. Kongelige Danske Videnskabernes  
 Selskabs Nat. og. Math. Afh., vol. vii. pp. 114, 223.
- MURÆNOIDES FASCIATUS *Gill*.  
*Gunnellus grœnlandicus Storer*. Synopsis Fishes N. A., p. 122.
- MURÆNOIDES MACROCEPHALUS *Gill*.  
*Gunnellus macrocephalus Girard*. Boston Journal of Nat. Hist.,  
 vol. vi. p. 263.
- MURÆNOIDES MUCRONATUS *Gill*.  
*Gunnellus mucronatus Storer*. Synopsis Fishes N. A., p. 122.
- MURÆNOIDES INGENS *H. R. Storer*.  
*Gunnellus ingens H. R. Storer*. Boston Journal of Nat. Hist.,  
 vol. vi. p. 26.

## Genus CENTROBLENNIUS Gill.

- CENTROBLENNIUS NUBILUS *Gill*.  
*Lumpenus nubilus Richardson*, in Last of the Artic Voyages, p.  
 359, pl. xxviii.
- CENTROBLENNIUS NEBULOSUS *Gill*.  
*Lumpenus gracilis Reinhardt, senr.* Kongelige Danske Videnska-  
 bernes Selskabs, Nat. og. Math. Afh., vol. vii. p. 194.

## Genus LUMPENUS Reinhardt.

- LUMPENUS FABRICII *Reinhardt*.  
*Gunnellus Fabricii Storer*. Synopsis Fishes N. A., p. 121.
- LUMPENUS MEDIUS *Reinhardt*.  
*Lumpenus medius Reinhardt*. Kongelige Danske Videnskabernes  
 Selskabs Nat. og. Math. Afh., vol. vii. p. 121.

## Genus LEPTOCLINUS Gill.

- LEPTOCLINUS MACULATUS *Gill*.  
*Lumpenus aculeatus Reinhardt*. Kongelige Danske Videnskaber-  
 nes Selskabs Nat. og. Math. Afh., vol. vii. p. 122.

## Genus STICHÆUS Reinhardt.

- STICHÆUS PUNCTATUS *Kroyer*.  
*Gunnellus punctatus Storer*. Synopsis Fishes N. A., p. 121.
- STICHÆUS PRÆCISUS *Kroyer*.  
*Stichæus præcisus Kroyer*. Naturhistorisk Tidsskrift, ser. i. vol.  
 i. p. 25.
- STICHÆUS SUBBIFURCATUS *Gill*.  
*Pholis subbifurcatus Storer*. Synopsis Fishes N. A., p. 118.

## Subfamily ZOARCEINÆ Gill.

## Genus ZOARCES Cuv.

- ZOARCES ANGUILLARIS *Storer*. "Ling," "Conger Eel."  
*Zoarces anguillaris Storer*. Synopsis Fishes N. A., p. 123.
- ZOARCES CILIATUS *Gill*.  
*Zoarces fimbriatus Storer*. Synopsis Fishes N. A., p. 123.

## Subfamily LYCODINÆ Gill.

## Genus LYCODES Reinhardt.

LYCODES VAHLII *Reinhardt*.

*Lycodes VahlII Reinhardt*. Kongelige Danske Videnskaberne  
Selskabs Nat. og. Math. Afh., vol. vii. p. 153, pl. v.

LYCODES RETICULATUS *Reinhardt*.

*Lycodes reticulatus Reinhardt*. Kongelige Danske Videnskaberne  
Selskabs Nat. og. Math. Afh., vol. vii. p. 167, pl. vi.

LYCODES SEMINUDUS *Reinhardt*.

*Lycodes seminudus Rheinhardt*. Kongelige Danske Videnska-  
berne Selskabs Nat. og. Math. Afh., vol. vii. p. 223.

LYCODES PERSPICILLUM *Kroyer*.

*Lycodes perspicillum Kroyer*. Oversigt over det Kgl. Danske Vi-  
denskabernes Selskabs, &c., 1844, p. 140.

LYCODES NEBULOSUS *Kroyer*.

*Lycodes nebulosus Kroyer*. Oversigt over det Kgl. Danske Vi-  
denskabernes Selskabs, &c., 1844, p. 140.

LYCODES MUCOSUS *Richardson*.\*

*Lycodes mucosus Richardson*, in Last of the Artic Voyages, p.  
362, pl. xxvi. pp. 1—5.

LYCODES\* POLARIS *Richardson*.\*

*Blennius polaris Sabine*, in Parry's Journal of a Voyage for the  
discovery of a Northwest Passage, &c., performed in 1819--20,  
&c., Supplement to Appendix, p. cexii.

## Subfamily ANARRHICANINÆ Gill.

## Genus ANARRHICAS Linn.

ANARRHICAS LUPUS *Linn*. "Wolf Fish."

*Anarrhicas lupus Fabricius*. Fauna Grœnlandica.

ANARRHICAS VOMERINUS (*Ag.*) *Storer*.\* "Wolf Fish."

*Anarrhicas lupus partim Storer*. Synopsis Fishes N. A., p. 124.

ANARRHICAS DENTICULATUS *Kroyer*.

*Anarrhicas denticulatus Kroyer*. Oversigt over det Kgl. Danske  
Videnskaberne Selskabs, &c., 1844, p. 140.

ANARRHICAS STEENSTRUPII *Gill*.

*Anarrhicas minor Fabricius*. Fauna Grœnlandica, No. 97.

## Family CRYPTACANTHOIDÆ Gill.

## Subfamily CRYPTACANTHINÆ Gill.

Genus CRYPTACANTHODES *Storer*.CRYPTACANTHODES MACULATUS *Storer*.

*Cryptacanthodes maculatus Storer*. Synopsis Fishes N. A., p. 58.

## Family LOPHIROIDÆ (Bon.)

## Subfamily LOPHIINÆ (Bon.)

Genus LOPHIUS *Linn*.LOPHIUS AMERICANUS *Val*. "Angler."

*Lophius americanus Storer*. Synopsis Fishes N. A., p. 129.

## Subfamily MALTHEINÆ Gill.

## Genus MALTHEA Cuv.

MALTHEA VESPERTILIO *Cuv.* "Bat Fish."

*Malthea vespertilio Storer.* Synopsis Fishes N. A., p. 131.

MALTHEA RADIATA *Gill.* "Bat Fish."

*Malthea nasuta Storer.* Synopsis Fishes N. A., p. 132.

MALTHEA NOTATA *Val.*

*Malthea notata Storer.* Synopsis Fishes N. A., p. 132.

## Subfamily ANTENNARIINÆ Gill.

## Genus ANTENNARIUS Com.

ANTENNARIUS VARIEGATUS *Gill.* "Mouse Fish."

*Chironectes lævigatus Storer.* Synopsis Fishes N. A., p. 130.

ANTENNARIUS GIBBUS *Gill.*

*Chironectes gibbus Storer.* Synopsis Fishes N. A., p. 130.

## Subfamily CERATIANÆ Gill.

## Genus CERATIAS Holboll.

CERATIAS HOLBOLLII *Kroyer.*

*Ceratias Holbollii Kroyer.* Naturhistorisk Tidsskrift, ser. ii. vol. i. p. 639.

## Subfamily HIMANTOLOPHINÆ Gill.

## Genus HIMANTOLOPHUS Reinhardt.

HIMANTOLOPHUS GRÆNLANDICUS *Reinhardt.*

*Himantolophus grænlandicus Reinhardt.* Kongelige Danske Videnskabernes Selskabs Nat. og. Math. Afh., vol. vii.

## Family CYCLOPTEROIDÆ (Bon.)

## Subfamily CYCLOPTERINÆ (Bon.)

## Genus CYCLOPTERUS Linn.

CYCLOPTERUS LUMPUS *Linn.* "Lump Fish."

*Lumpus anglorum Storer.* Synopsis Fishes N. A., p. 229.

CYCLOPTERUS SPINOSUS *Fabricius.*

*Lumpus spinosus Storer.* Synopsis Fishes N. A., p. 230.

## Subfamily LIPARINÆ Gill.

## Genus LIPARIS Artedi.

LIPARIS FABRICII *Kroyer.*

*Liparis communis Storer.* Synopsis Fishes N. A., p. 230.

LIPARIS GELATINOSUS *Pallas.*

*Liparis gelatinosus Storer.* Synopsis Fishes N. A., p. 231.

## (Suborder ANACANTHINI Müller.)

## Family GADOIDÆ (Cuv.)

## Subfamily GADINÆ (Bon.)

## Genus GADUS Linn.

- GADUS MORRHUA *Linn.* "Bank Codfish."  
*Morrhua vulgaris Storer.* Synopsis Fishes N. A., p. 216.
- GADUS AMERICANUS *Gill.\** "Codfish."  
*Morrhua americana Storer.* Synopsis Fishes N. A., p. 215.
- GADUS PRUINOSUS *Mitchill.* "Tom Cod."  
*Morrhua pruinosa Storer.* Synopsis Fishes N. A., p. 216.
- GADUS MINUTUS *Linn.*  
*Morrhua minuta Storer.* Synopsis Fishes N. A., p. 217.
- GADUS OJAC *Richardson.*  
*Morrhua ojac Storer.* Synopsis Fishes N. A., p. 217.
- GADUS ÆGLIFINUS *Linn.* "Haddock."  
*Morrhua æglifinus Storer.* Synopsis Fishes N. A., p. 215.
- GADUS FABRICII *Richardson.*  
*Morrhua Fabricii Storer.* Synopsis Fishes N. A., p. 217.

## Genus MERLANGUS Cuv.

- MERLANGUS PURPUREUS *Storer.*  
*Merlangus purpureus Storer.* Synopsis Fishes N. A., p. 220.
- MERLANGUS LEPTOCEPHALUS *Dekay.\**  
*Merlangus leptocephalus Storer.* Synopsis Fishes N. A., p. 221.

## Genus POLLACHIUS Bon.

- POLLACHIUS CARBONARIUS *Bon.* "Coal Fish."  
*Merlangus carbonarius Storer.* Synopsis Fishes N. A., p. 220.
- POLLACHIUS POLARIS *Gill.*  
*Merlangus polaris Storer.* Synopsis Fishes N. A., p. 220.

## Genus MERLUCIUS Raf.

- MERLUCIUS VULGARIS *Fleming.* "Hake."  
*Merlucius vulgaris Reinhardt.* Naturhistoriske Bidrag, &c., of  
 Grønland, p. 24.
- MERLUCIUS BILINEARIS\* *Gill.* "Hake."  
*Merlucius albidus Storer.* Synopsis Fishes N. A., p. 218.

## Genus LOTA Cuv.

- LOTA MOLVA *Cuv.*  
*Lota molva Fabricius.* Fauna Grønlandica, No. 106.

## Genus MOTELLA Cuv.

- MOTELLA REINHARDI (*Kroyer.*)  
*Motella mustela Reinhardt.* Kongelige Danske Videnskabernes  
 Selskabs Nat. og. Math., vol. vii., p. 115.
- MOTELLA ENSIS *Reinhardt.*  
*Motella ensis Reinhardt.* Kongelige Danske Videnskabernes  
 Selskabs Nat. og. Math., vol. vii., pp. 115, 128.



**MOTELLA ARGENTATA** *Reinhardt.*

*Motella argentata Reinhardt.* Kongelige Danske Videnskabernes  
Selskabs Nat. og. Math., vol. vii., pp. 115, 128.

**MOTELLA CAUDACUTA** *Storer.\**

*Motella caudacuta Storer.* Proc. Boston Society of Nat. Hist.,  
1848, p. 5.

Genus **BROSMIUS** Cuv.**BROSMIUS BROSME** *White.*

*Brosmius vulgaris Storer.* Synopsis Fishes N. A.,

**BROSMIUS FLAVESCENS** *Lesueur.*

*Brosmius flavescens Storer.* Synopsis Fishes N. A., p. 221.

Subfamily **PHYCINÆ** Sw.Genus **PHYCIS** Artedi.**PHYCIS AMERICANUS** *Cuv.*

*Phycis americanus Storer.* Synopsis Fishes N. A., p. 221.

**PHYCIS DEKAYI** *Kaup.*

*Phycis Dekayi Kaup.* Archiv für Naturgeschichte, 1858, vol. i.,  
p. 89.

**PHYCIS TENUIS** *Dekay.*

*Phycis tenuis Storer.* Synopsis Fishes N. A., p. 222.

**PHYCIS REGALIS** *Kaup.*

*Phycis punctatus Storer.* Synopsis Fishes N. A., p. 222.

Subfamily **BYTHITINÆ** Gill.Genus **BYTHITES** Reinhardt.**BYTHITES FUSCUS** *Reinhardt.*

*Bythites fuscus Reinhardt.* Kongelige Danske Videnskabernes  
Selskabs Nat. og. Math. Afh., vol. vii., p. 175.

Family **MACRUROIDÆ** (Bon.)Subfamily **MACRURINÆ** (Bon.)Genus **MACRURUS** Bloch.**MACRURUS RUPESTRIS** *Bloch.*

*Macrurus rupestris Storer.* Synopsis Fishes N. A., p. 222.

**MACRURUS NORVEGICUS** *Bon.*

*Macrurus Strœmii Reinhardt.* Oversigt over det Kgl. Danske  
Videnskabernes Selskabs, &c., 1844, p. 140.

Family **OPHIDIIDOIDÆ** Bon.Subfamily **OPHIDIINÆ** Bon.Genus **OPHIDIUM** Linn.**OPHIDIUM MARGINATUM** *Dekay.*

*Ophidium marginatum Storer.* Synopsis Fishes N. A., p. 235.

## (Suborder PHARYNGOGNATHI Müller.)

Family LABROIDÆ (Cuv.)

Subfamily LABRINÆ (Bon.)

Genus TAUTOGA (Mitchill) Val.

TAUTOGA AMERICANA *Dekay*. "Tautog," "Black Fish."Tautoga americana *Storer*. Synopsis Fishes N. A., p. 137.

Genus CTENOLABRUS Val.

CTENOLABRUS BURGALL *Gill*. "Cunner."Ctenolabrus ceruleus *Storer*. Synopsis Fishes N. A., p. 134.

Subfamily XYRICHTHYINÆ Gill.

Genus XYRICHTHYS Cuv.

XYRICHTHYS LINEATUS *Val*.Xyrichthys lineatus *Storer*. Synopsis Fishes N. A., p. 141.

## Suborder HETEROSOMATA (Bon.)

Family PLEURONECTOIDÆ (Bon.)

Subfamily PLEURONECTINÆ (Bon.)

Genus HIPPOGLOSSUS Cuv.

HIPPOGLOSSUS VULGARIS *Cuv*.Hippoglossus vulgaris *Storer*. Synopsis Fishes N. A., p. 223.

Genus REINHARDTIUS Gill.

REINHARDTIUS HIPPOGLOSSOIDES *Gill*.Pleuronectes cynoglossus *Fabricius*. Fauna Grœnlandica, p. 163, No. 118.

Genus CHÆNOPSETTA Gill.

CHÆNOPSETTA OBLONGA *Gill*.Platessa oblonga *Storer*. Synopsis Fishes N. A., p. 225.CHÆNOPSETTA OBLONGA *Gill*, var. ocellaris.Platessa oblonga (partim) *Storer*. Synopsis Fishes N. A., p. 225.

Genus HIPPOGLOSSOIDES Gottsche.\*

HIPPOGLOSSOIDES DENTATUS\* *Gill*.Platessa dentata *Storer*. Synopsis Fishes N. A., p. 224.

Genus DREPANOPSETTA Gill.

DREPANOPSETTA PLATESSOIDES *Gill*.Pleuronectes platessoides *Fabricius*. Fauna Grœnlandica, p. 164, No. 119.

Genus PLEURONECTES (Artemi) (non Bonap.)

PLEURONECTES AMERICANUS *Walbaum*.Platessa plana *Storer*. Synopsis Fishes N. A., p. 222.

PLEURONECTES PUSILLUS *Gill.*

*Platessa pusilla* *Storer.* Synopsis Fishes N. A., p. 223.

Genus MYZOPSETTA *Gill.*

MYZOPSETTA FERRUGINEA *Gill.*

*Platessa ferruginca* *Storer.* Synopsis Fishes N. A., p. 224.

MYZOPSETTA\* ROSTRATA *Gill.*

*Platessa rostrata* *H. R. Storer.* Boston Journal of Nat. Hist.,  
vol. vi., p. 268.

*Pleuronectinae of Uncertain Genus.*

PLATESSA GLABRA *Storer.* Proc. Boston Society of Nat. Hist., 1843,  
p. 130.

PLATESSA QUADROULARIS *Storer.* Proc. Boston Society of Nat. Hist.,  
1847, p. 242.

Subfamily RHOMBINÆ *Gill.*

Genus LOPHOPSETTA *Gill.*

LOPHOPSETTA MACULATA *Gill.*

*Pleuronectes maculatus* *Storer.* Synopsis Fishes N. A., p. 227.

Subfamily SOLEINÆ (Bon.)

Genus GRAMMICHTHYS *Kaup.*

GRAMMICHTHYS LINEATUS *Kaup.*

*Achirus mollis* *Storer.* Synopsis Fishes N. A., p. 228.

Subfamily PLAGIUSINÆ (Bon.)

Genus GLOSSICHTHYS *Gill.*

GLOSSICHTHYS PLAGIUSA *Gill.*

*Plagusia fasciata* *Storer.* Synopsis Fishes N. A., p. 228.

Suborder PHYSOSTOMI (Müller.)

Family CYPRINODONTOIDÆ.

Subfamily CYPRINODONTINÆ *Gill.*

Genus CYPRINODON *Lac.*

CYPRINODON VARIEGATUS *Lac.* "Killie Fish."

*Lebias ellipsoides* (*Les.*) *Storer.* Synopsis Fishes N. A., p. 179.

*Cyprinodon variegatus* (*Lac.*) *Storer.* Synopsis Fishes N. A.,  
p. 183.

CYPRINODON PARVUS *Baird and Girard.*

*Cyprinodon parvus* *Baird.* Ninth Annual Report of Smithsonian  
Inst., p. 345.

Subfamily HYDRARGYRINÆ *Gill.*

Genus HYDRARGYRA (*Lac.*)

HYDRARGYRA SWAMPINA *Lac.* "Killifish."

*Hydrargyra swampina* *Cuv. et Val.* Hist. Nat. des Poissons,  
vol. xviii., p. 203.

HYDRARGYRA MAJALIS *Val.*

*Hydrargyra flavula Storer.* Synopsis Fishes N. A., p. 180.

HYDRARGYRA LUCIÆ *Baird.*

*Hydrargyra Lucie Baird.* Ninth Annual Report of Smithsonian Inst., p. 345.

## Genus FUNDULUS (Lac.)

FUNDULUS HETEROCLITUS *Gill.* "Killifish."

*Hydrargyra fasciata Storer.* Synopsis Fishes N. A., p. 180.

FUNDULUS PISCULENTUS *Val.\**

*Hydrargyra pisculenta Storer.* Synopsis Fishes N. A., p. 180.

FUNDULUS ZONATUS *Val.\**

*Esox zonatus Mitchell.* Transactions of Literary and Philosophical Society of N. Y., vol. i., p. 433.

*Fundulus zonatus Cuv. et Val.* Hist. Nat. des Poissons, vol. xviii., p. 196.

FUNDULUS CINGULATUS *Val.*

*Fundulus cingulatus Cuv. et Val.* Hist. Nat. des Poissons, vol. xviii., p. 197.

FUNDULUS DIAPHANUS *Ag.*

*Hydrargyra diaphana Storer.* Synopsis Fishes N. A., p. 181.

FUNDULUS MULTIFASCIATUS *Val.*

*Hydrargyra multifasciata Storer.* Synopsis Fishes N. A., p. 181.

## Family SALMONOIDÆ (Cuv.)

## Subfamily SALMONINÆ (Bon.)

## Genus SALMO Linn.

SALMO SALAR *Linn.* "Salmon."

*Salmo salar Storer.* Synopsis Fishes N. A., p. 192.

SALMO HAMATUS *Cuv.\**

*Salmo hamatus Brevoort.* Notes on some Figures of Japanese Fish.

SALMO CARPIO *Linn.*

*Salmo carpio Fabricius.* Fauna Grœnlandica, p. 170, No. 124.

SALMO ALPINUS *Linn.*

*Salmo alpinus Fabricius.* Fauna Grœnlandica, p. 173, No. 125.

SALMO STAGNALIS *Fabricius.*

*Salmo stagnalis Fabricius.* Fauna Grœnlandica, p. 175, No. 126.

SALMO RIVALIS *Fabricius.*

*Salmo rivalis Fabricius.* Fauna Grœnlandica, p. 176, No. 127.

SALMO HEARNII *Richardson.*

*Salmo Hearnii Storer.* Synopsis Fishes N. A., p. 194.

SALMO ALIPES *Richardson.*

*Salmo alipes Storer.* Synopsis Fishes N. A., p. 195.

SALMO NITIDUS *Richardson.*

*Salmo nitidus Storer.* Synopsis Fishes N. A., p. 195.

SALMO HOODII *Richardson.*

*Salmo Hoodii Storer.* Synopsis Fishes N. A., p. 195.

SALMO PENSHINENSIS *Pallas.*

*Salmo Rossii Storer.* Synopsis Fishes N. A., p. 194.

SALMO IMMACULATUS *H. R. Storer.*

*Salmo immaculatus H. R. Storer.* Boston Journal of Nat. Hist.,  
vol. vi., p. 269.

Genus OSMERUS Artedi.

OSMERUS MORDAX *Gill.* "Smelt."

*Osmerus viridescens Storer.* Synopsis Fishes N. A., p. 197.

Subfamily ARGENTININÆ Gill.

Genus MALLOTUS Cuv.

MALLOTUS VILLOSUS *Cuv.* "Capelin."

*Mallotus villosus Storer.* Synopsis Fishes N. A., p. 202.

Family SYNODONTOIDÆ Gill.

Subfamily SYNODONTINÆ Gill.

Genus SYNODUS Gronovius.

SYNODUS FÆTENS *Gill.*

*Saurus mexicanus Storer.* Synopsis Fishes N. A., p. 203.

Genus TRACHINOCEPHALUS Gill.

TRACHINOCEPHALUS MYOPS *Gill.*

*Saurus myops Cuv. et Val.* Hist. Nat. des Poissons, vol. xxii.,  
p. 485.

Family SCOPELOIDÆ (Bon.)

Subfamily SCOPELINÆ (Bon.)

Genus SCOPELUS Cuv.

SCOPELUS MULLERI *Gill.\**

*Scopelus Humboldtii Storer.* Synopsis Fishes N. A., p. 198.

SCOPELUS GLACIALIS *Reinhardt.*

*Scopelus glacialis Reinhardt.* Kongelige Danske Videnskabernes  
Selskabs Nat. og. Math. Afh., vol. vi., p. 110.

*Labijs exoletus Fabricius.* Fauna Grœnlandica, p. 166, No. 120,  
(not "*Acantholabrus exoletus, Val.,*" *Storer.*)

Family PARALEPIDOIDÆ Gill.

Subfamily PARALEPIDINÆ (Bon.)

Genus PARALEPIS Risso.

PARALEPIS BOREALIS *Reinhardt.*

*Paralepis borealis Reinhardt.* Kongelige Danske Videnskabernes  
Selskabs Nat. og. Math. Afh., vol. vii., pp. 115, 125.

Family CHAULIODONTOIDÆ (Bon.)

Subfamily STOMIANÆ Gill.

Genus STOMIAS Cuv.

STONIAS FEROX *Reinhardt.*

*Stomias ferox Reinhardt.* Kongelige Danske Videnskabernes  
Selskabs Nat. og. Math. Afh., vol. x., p. 78.

## Family MICROSTOMATOIDÆ Gill.

## Subfamily MICROSTOMATINÆ Gill.

## Genus MICROSTOMA Risso.

MICROSTOMA GRÆNLANDICUM (*Reinhardt*.)

*Microstomus grænlandicus Reinhardt*. Kongelige Danske Videnskabernes Selskabs Nat. og. Math. Afh., vol., viii., p. 74.

## Family CLUPÆOIDÆ (Val.)

## Subfamily CLUPÆINÆ (Bon.)

## Genus CLUPEA (Linn.)

CLUPEA ELONGATA *Lesueur*. "Herring."

*Clupea elongata Storer*. Synopsis Fishes N. A., p. 204.

*Clupea minima Storer*. Synopsis Fishes N. A., p. 205.

CLUPEA HARENGUS *Linn*. "Herring."

*Clupea harengus Storer*. Synopsis Fishes N. A., p. 206.

## Genus ALAUSELLA Gill.

ALAUSELLA PARVULA *Gill*.

\**Clupea parvulus Storer*. Synopsis Fishes N. A., p. 205.

## Genus MELETTA Val.

MELETTA MATTOWACCA *Val*. "Fall Herring."

*Alosa mattowacca Storer*. Synopsis Fishes N. A., p. 207.

MELETTA VENOSA *Val*.

*Meletta venosa Cuv. et Val*. Hist. Nat. des Poissons, vol. vii., p. 374.

## Genus OPISTHONEMA Gill.

OPISTHONEMA THRISSE *Gill*. "Thread Herring."

*Chatoëssus oolina Storer*. Synopsis Fishes N. A., p. 209.

*Chatoëssus notatus Storer*. Synopsis Fishes N. A., p. 209.

*Chatoëssus signifer Storer*. Synopsis Fishes N. A., p. 210.

## Genus ALAUSA (Cuv.) Val.

ALAUSA SAPIDISSIMA (*Storer*.) Shad.

*Alosa sapidissima Storer*. Synopsis Fishes N. A., p. 206.

ALAUSA\* VIRESCENS *Gill*.

*Clupea virescens Storer*. Synopsis Fishes N. A., p. 204.

ALAUSA\* CYANONOTON (*Storer*.)

*Alosa cyanonoton Storer*. Proc. Boston Society of Nat. Hist., vol. ii. p. 242.

ALAUSA TYRANNUS (*DeKay*.) "Alewife."

*Alosa tyrannus Storer*. Synopsis Fishes N. A., p. 207.

ALAUSA\* LINEATA *Storer*.

*Alosa lineata Storer*. Proc. Boston Society of Nat. Hist., vol. ii., p. 242.

ALAUSA FASCIATA *Gill*.

*Clupea fasciata Storer*. Synopsis Fishes N. A., p. 204.

*Alosa teres Cuv. et Val*. Hist. Nat. des Poissons, vol. xx. p. 423.  
(non *Alosa teres DeKay*.)

## Genus BREVOORTIA Gill.

BREVOORTIA MENHADEN Gill. "Mossbanker."

Alosa menhaden Storer. Synopsis Fishes N. A., p. 207.

Alosa sadina Storer. Synopsis Fishes N. A., p. 208.

Clupea cœrulea Storer. Synopsis Fishes N. A., p. 205.

## Subfamily ENGRAULINÆ Gill.

## Genus ENGRAULIS Cuv.

ENGRAULIS VITTATUS Baird and Girard. "Anchovy."

Clupea vittata Storer. Synopsis Fishes N. A., p. 205.

ENGRAULIS BROWNII Val.

Engraulis Brownii Cuv. et Val. Hist. Nat. des Poissons, vol. xxi., p. 41.

## Subfamily DOROSOMATINÆ Gill.

## Genus DOROSOMA (Raf.)

DOROSOMA CEPEDIANUM Gill.

Chatoëssus Cepedianus Storer. Synopsis Fishes N. A., p. 209.

Chatoëssus ellipticus Storer. Synopsis Fishes N. A., p. 210.

DOROSOMA INSOCIABILE Gill.\*

Chatoëssus insociabilis Abbott. Proceedings of the Academy of Natural Sciences of Phila., 1860.

## Family CONORHYNCHOIDÆ Gill.

## Subfamily CONORHYNCHINÆ Gill.

## Genus CONORHYNCHUS Nozeman.

CONORHYNCHUS MACROCEPHALUS Gill.

Butrinus vulpes Storer. Synopsis Fishes N. A., p. 212.

## Subfamily DUSSUMIERINÆ Gill.

## Genus ETRUMEUS Bleeker.

ETRUMEUS TERES Brevoort.

Alosa teres Storer. Synopsis Fishes N. A., p. 208.

## Family ELOPOIDÆ (Val.)

## Subfamily ELOPINÆ Gill.

## Genus ELOPS Linn.

ELOPS SAURUS Linn.

Elops saurus Storer. Synopsis Fishes N. A., p. 211.

## Genus MEGALOPS Lac.

MEGALOPS ELONGATUS Girard.

Megalops elongatus Girard. Proceedings of the Academy of Natural Sciences of Phila., 1858, p. —, 1859, p. 64.

## Order APODES Kaup.

## Family ANGUILLOIDÆ Sarrell.

## Subfamily CONGERINÆ Gill.

## Genus CONGER Cuv.

CONGER OCCIDENTALIS DeKay. "Conger."

Conger occidentalis Storer. Synopsis Fishes N. A., p. 235.

## Genus ISOGNATHA (DeKay)\*

ISOGNATHA OCEANICA *DeKay*.*Anguilla oceanica Storer*. Synopsis Fishes N. A., p. 234.

## Subfamily ANGUILLINÆ (Raf.)

## Genus ANGUILLA Thunberg.

ANGUILLA BOSTONIENSIS *DeKay*. "Eel."*Anguilla bostoniensis Storer*. Synopsis Fishes N. A., p. 233.ANGUILLA MACROCEPHALA *DeKay*. "Bull-head Eel."*Anguilla macrocephala Storer*. Synopsis Fishes N. A., p. 234.ANGUILLA SERPENTINA *Storer*.*Anguilla serpentina Storer*. Synopsis Fishes N. A., p. 234.ANGUILLA ARGENTEA *DeKay*. "Eel."*Anguilla argentea Storer*. Synopsis Fishes N. A., p. 233.ANGUILLA NOVÆ-TERRÆ *Kaup*.\**Anguilla novæ-terræ Kaup*. Catalogue of Apodal Fish in British Museum, p. 45.

## Order LEMNISCATI.

## Family LEPTOCEPHALOIDÆ (Bon.)

## Subfamily LEPTOCEPHALINÆ (Bon.)

## Genus LEPTOCEPHALUS Gron.

LEPTOCEPHALUS GRACILIS *Storer*.*Leptocephalus gracilis Storer*. Synopsis Fishes N. A., p. 272.

## Order NEMATOGNATHI Gill.

## Family SILUROIDÆ (Cuv.) Blkr.

## Subfamily BAGRINÆ Blkr.

## Genus AILURICHTHYS Baird and Girard.

AILURICHTHYS MARINUS *Baird and Girard*. "Catfish."*Galeichthys marinus Storer*. Synopsis Fishes N. A., p. 149.

## Genus ARIOPSIS Gill.

ARIOPSIS MILBERTI *Gill*. "Catfish."*Arius milberti Storer*. Synopsis Fishes N. A., p. 149.

## Order PLECTOGNATHI Cuv.

## Family BALISTOIDÆ Cuv.

## Subfamily BALISTINÆ (Bon.)

## Genus CAPRISCUS Linn.

CAPRISCUS FULIGINOSUS *Gill*. "File Fish."*Balistis fuliginosus Storer*. Synopsis Fishes N. A., p. 243.

## Subfamily MONACANTHINÆ Kaup.

## Genus CANTHORHINUS (Sw.)

CANTHORHINUS MASSACHUSETTENSIS *Gill*. "File Fish."*Monacanthus massachusettsensis Storer*. Synopsis Fishes N. A., p. 244.



*CANTHORHINUS BROCCUS Gill.*

*Monacanthus broccus Storer.* Synopsis Fishes N. A., p. 244.

*CANTHORHINUS SIGNIFER Gill.*

*Monacanthus signifer Storer.* Synopsis Fishes N. A., p. 245.

Genus *CERATACANTHUS Gill.**CERATACANTHUS AURANTIACUS Gill.*

*Monacanthus aurantiacus Storer.* Synopsis Fishes N. A., p. 241.

Genus *ALUTERA Cuv.**ALUTERA CUSPICAUDA (Dekay.)*

*Aluteres cuspicauda Storer.* Synopsis Fishes N. A., p. 245.

Family *OSTRACIONTOIDÆ (Cuv.)*Subfamily *OSTRACIONTINÆ (Bon.)*Genus *TETRASOMUS Sw.**TETRASOMUS CAMELINUS Gill.* "Trunk Fish."

*Lactophrys camelinus Storer.* Synopsis Fishes N. A., p. 247.

Genus *RHINESOMUS (Sw.)**RHINESOMUS YALEI Gill.* "Trunk Fish."

*Lactophrys Yalei Storer.* Synopsis Fishes N. A., p. 246.

Family *ORTHAGORISCOIDÆ (Bon.)*Subfamily *ORTHAGORISCINÆ (Bon.)*Genus *ORTHAGORISCUS (Bloch.)**ORTHAGORISCUS MOLA Schreider.*

*Orthagoriscus mola Storer.* Synopsis Fishes N. A., p. 243.

Subfamily *MOLACANTHINÆ Gill.*Genus *MOLACANTHUS Sw.**MOLACANTHUS CARINATUS Gill.*

*Acanthosoma carinatum Storer.* Synopsis Fishes N. A., p. 242.

Family *DIODONTOIDÆ (Rich.)*Subfamily *DIODONTINÆ (Gill.)*Genus *DIODON Linn.**DIODON PILOSUS Mitchill.*

*Diodon pilosus Storer.* Synopsis Fishes N. A., p. 240.

Subfamily *TRIRHIZACANTHINÆ Gill.*Genus *CHILOMYCTERUS Bibron.**CHILOMYCTERUS GEOMETRICUS Kaup.*

*Diodon maculo-striatus Storer.* Synopsis Fishes N. A., p. 240.

*CHILOMYCTERUS FULIGINOSUS Gill.\**

*Diodon fuliginosus Dekay.* Zoology of New York, Fishes, p. 324.  
pl. iv., fig. 181.

*Diodon maculo-striatus* (young) *Storer*. Synopsis Fishes N. A., p. 240.

*CHILOMYCTERUS VERRUCOSUS* *Gill*.\*

*Diodon verrucosus* *Storer*. Synopsis Fishes N. A., p. 240.

Family TETRODONTOIDÆ (Bon.)

Subfamily TETRODONTINÆ (Bon.)

Genus LAGOCEPHALUS Sw.

*LAGOCEPHALUS LÆVIGATUS* *Gill*.

*Tetraodon lagocephalus* (partim) *Storer*. Synopsis Fishes N. A., p. 241.

*Tetraodon lævigatus* *Storer*. Synopsis Fishes N. A., p. 241.

*Tetraodon curvus* (young) *Storer*. Synopsis Fishes N. A., p. 242.

Genus GASTROPHYSUS Müll.

*GASTROPHYSUS TURGIDUS* *Gill*.

*Tetraodon turgidus* *Storer*. Synopsis Fishes N. A., p. 241.

Order LOPHOBRANCHII Cuv.

Family SYNGNATHOIDÆ (Bon.)

Subfamily SYNGNATHINÆ (Bon.)

Genus SYNGNATHUS Linn.

*SYNGNATHUS PECKIANUS* *Storer*. "Pipe Fish."

*Syngnathus peckianus* *Storer*. Synopsis Fishes N. A., p. 238.

Subfamily HIPPOCAMPINÆ Bon.

Genus HIPPOCAMPUS Cuv.

*HIPPOCAMPUS HUDSONIUS* *Dekay*. "Sea Horse."

*Hippocampus hudsonius* *Storer*. Synopsis Fishes N. A., p. 239.

Subclass GANOIDEI (Ag.) Müller.

Order CHONDROSTEI (Müller.)

Family STURIONOIDÆ (Richardson.)

Subfamily ACIPENSERINÆ (Bon.)

Genus ACIPENSER Linn.

*ACIPENSER OXYRHYNCHUS* *Mitchell*. "Sturgeon."

*Acipenser oxyrhynchus* *Storer*. Synopsis Fishes N. A., p. 244.

Genus HUSO Fitz and Heckel.

*HUSO BREVIROSTRIS* *Fitz. and Heckel*. "Sturgeon."

*Acipenser brevirostris* *Storer*. Synopsis Fishes N. A., p. 248.

## Subclass ELASMOBRANCHII Bon.

## Order PLAGIOSTOMI Cuv.

## Suborder SQUALI (Müll. and Henle.) Gill.

## Family SQUALOIDÆ (Bon.)

## Subfamily SQUALINÆ (Bon.)

## Genus SQUALUS (Linn.)

SQUALUS OBSCURUS *Lesueur*. ("Dusky Shark.")

*Carcharias obscurus Storer*. Synopsis Fishes N. A., p. 251.

SQUALUS MILBERTI *Bon*.

*Carcharias (Prionodon) Milberti Müll. and Henle*, Systematische Beschreibung der Plagiostomen, p. 38.

SQUALUS CÆRULEUS *Mitchill*.

*Carcharias cæruleus Storer*. Synopsis Fishes N. A., p. 251.

*Lamna caudata (Dekay) Storer*. Synopsis Fishes N. A., p. 252.

## Genus APRIONODON Gill.

APRIONODON PUNCTATUS *Gill*.

*Squalus punctatus Mitchill*. Transactions of the Literary and Philosophical Society of New York, i. p. 485. (Not Dekay and Storer.)

*Carcharias (Aprion)isodon, Müll. and Henle*. Systematische Beschreibung der Plagiostomen, p. 32.

## Genus SCOLIODON Müll. and Henle.

SCOLIODON TERRÆ-NOVÆ *Gill*.

*Squalus (Carcharias) terræ-novæ Richardson*. Fauna Boreali-Americana, iii. p. 289.

*Species of Uncertain Genus.*

CARCHARIAS ATWOODI *Storer*. Proceedings Boston Society of Nat. Hist., 1848, p. 72.

## Family CESTRACIONTOIDÆ Gill.

## Subfamily CESTRACIONTINÆ Gill.

## Genus CESTRACION Klein.

CESTRACION SUBARCUATUS *Gill*. ("Hammer-headed Shark.")

*Zygæna malleus Storer*. Synopsis Fishes N. A., p. 256.

CESTRACION TIBURO *Gill*.\*

*Zygæna tiburo Baird*. Ninth Annual Report of Smith. Inst. for 1854, p. \*337.

## Family MUSTELOIDÆ Girard.

## Subfamily MUSTELINÆ Bon.

## Genus MUSTELUS Art.

MUSTELUS CANIS *Dekay*. ("Dog Fish.")

*Mustelus canis Storer*. Synopsis Fishes N. A., p. 253.

## Family LAMNOIDÆ Müller.

## Subfamily ISURINÆ Gray.

## Genus OXYRHINA Ag.

OXYRHINA DĒKAYI *Gill.*

*Lamna punctata* *Storer.* Synopsis Fishes N. A., p. 252.  
(Not *Squalus punctatus* *Mitchill.*)

## Genus CARCHARODON Smith.\*

CARCHARODON RONDELETHI *Müll. and Henle.\**

*Squalus* (*Carcharias*) *vulgaris* *Richardson.* Fauna Boreali-Americana, iii. p. 288.

## Subfamily CETORHININÆ Gill.

## Genus CETORHINUS Blainville.

CETORHINUS MAXIMUS *Blainville.* ("Basking Shark.")

*Selachus maximus* *Storer.* Synopsis Fishes N. A., p. 254.

## Subfamily ODONTASPIDINÆ Bon.

## Genus EUGOMPHODUS Gill.

EUGOMPHODUS GRISEUS *Gill.*

*Carcharias griseus* *Storer.* Synopsis Fishes N. A., p. 252.

*Species of Uncertain Genus.*CARCHARIAS LITTORALIS *Storer.* Synopsis Fishes N. A., p. 251.

SQUALUS AMERICANUS *Mitchill.* Transactions of the Literary and Philosophical Society of New York, i. p. 483.

## Family ALOPECIOIDÆ Ag.

## Subfamily ALOPECINÆ (Bon.)

## Genus ALOPIAS Raf.

ALOPIAS VULPES *Bon.* ("Fox Shark," or "Thrasher.")

*Alopias vulpes* *Storer.* Synopsis Fishes N. A., p. 253.

## Family SPINACOIDÆ (Rich.)

## Subfamily SPINACINÆ (Bon.)

## Genus ACANTHIAS (Risso.)

ACANTHIAS AMERICANUS *Storer.* ("Spiked Dog Fish.")

*Acanthias americanus* *Storer.* Synopsis Fishes N. A., p. 254.

## Genus CENTROSCYLLIUM Müll. and Henle.

CENTROSCYLLIUM FABRICHI *Müll. and Henle.*

*Squalus acanthias* *Fabricius.* Fauna Grœnlandica, p. 126, No. 88.

## Family SCYMNOIDÆ (Bon.)

## Subfamily SCYMNINÆ (Bon.)

## Genus SOMNIOSUS Les.

SOMNIOSUS MICROCEPHALUS *Gill.*

*Squalus carcharias* *Fabricius.* Fauna Grœnlandica, p. 127, No. 89.

SOMNIOSUS BREVIPINNA *Les.\** "Sleeper."

*Scymnus brevipinna* *Storer.* Synopsis Fishes N. A., p. 255.

## Suborder RHINÆ Gill.

## Family SQUATINOIDÆ (Bon.)

## Subfamily SQUATININÆ (Bon.)

## Genus RHINA Klein.

RHINA DUMERILI\* *Gill.* "Angel Fish."*Squatina Dumerili Storer.* Synopsis Fishes N. A., p. 256.

## Suborder PRISTES Gill.

## Family PRISTOIDÆ Ag.

## Subfamily PRISTINÆ (Bon.)

## Genus PRISTIS Latham.

PRISTIS ANTIQUORUM\* *Latham.* "Saw Fish."*Pristis antiquorum Storer.* Synopsis Fishes N. A., p. 257.

## Suborder RALÆ (M. &amp; H.) Gill.

## Family TORPEDINOIDÆ (Bon.)

## Subfamily TORPEDININÆ (Bon.)

## Genus NARCACION Klein.

NARCACION OCCIDENTALE *Gill.* "Torpedo."*Torpedo occidentalis Storer.* Synopsis Fishes N. A., p. 264.

## Family RAIROIDÆ (Bon.)

## Subfamily RAIAINÆ (Bon.)

## Genus RAIJA Linn.

RAIJA LÆVIS *Mitchill.* "Ray."*Raja lævis Storer.* Synopsis Fishes N. A., p. 259.RAIJA DIAPHANES *Mitchill.**Raja diaphanes Storer.* Synopsis Fishes N. A., p. 258.RAIJA ERINACEA *Mitchill.**Raja erinacea Storer.* Synopsis Fishes N. A., p. 259.RAIJA AMERICANA *Dekay.**Raja Americana Storer.* Synopsis Fishes N. A., p. 260.RAIJA OCELLATA *Mitchill.\***Raja ocellata Storer.* Synopsis Fishes N. A., p. 258.RAIJA CHANTENAY *Lesueur.\***Raja chantenay Storer.* Synopsis Fishes N. A., p. 260.RAIJA RADIATA *Donovan.**Raja fullonica Fabricius.* Fauna Grœnlandica, p. 125, No. 87.RAIJA EGLANTERIA *Lesueur.\***Raja eglanteria Storer.* Synopsis Fishes N. A., p. 260.

## Family TRYGONOIDÆ (Bon.)

## Subfamily TRYGONINÆ (Bon.)

## Genus TRYGON Adanson.

TRYGON SAYI *Müll. and Henle*. "Sting Ray."*Myliobatis sayi* Storer. Synopsis Fishes N. A., p. 262.

TRYGON HASTATA\* Storer.

*Trygon hastata* Storer. Synopsis Fishes N. A., p. 261.

## Genus PTEROPLATEA Müll. and Henle.

PTEROPLATEA MACLURA *Müll. and Henle*.\**Trygon maclura* Storer. Synopsis Fishes N. A., 261.

## Family MYLIOBATOIDÆ (Müll. and Henle.)

## Subfamily MYLIOBATINÆ (Bon.)

## Genus MYLIOBATUS Dum.

MYLIOBATUS BISPINOSUS Storer.

*Myliobatis acuta* Storer. Synopsis Fishes N. A., p. 262.

## Genus ÆTOBATUS Müller and Henle.

ÆTOBATUS NARINARI *Müll. and Henle*.*Ætobatis guttata* Storer. Catalogue of the Fauna of South Carolina, p. 13.

## Genus RHINOPTERA Cuv.

RHINOPTERA QUADRILOBA Cuv.

*Rhinoptera quadriloba* Storer. Synopsis Fishes N. A., 263.*Species of Uncertain Genus.*

MYLIOBATUS FREMENVILLEI Storer. Synopsis Fishes N. A., p. 262.

## Family CEPHALOPTEROIDÆ (Bon.)

## Subfamily CEPHALOPTERINÆ (Bon.)

## Genus CERATOPTERA Müll. and Henle.

CERATOPTERA VAMPIRUS *Gill*. "Devil Fish."*Cephaloptera vampirus* Storer. Synopsis Fishes N. A., p. 264.*Diabolichthys Elliottii* Holmes. Proceedings of Elliott Society of Nat. Hist.

## Subclass DERMOPTERI (Owen.)

## Order HYPEROARTII (Bon.)

## Family PETROMYZONTOIDÆ (Bon.)

## Subfamily PETROMYZONTINÆ Gill.

## Genus PETROMYZON (Linn.)

PETROMYZON AMERICANUS *Lesueur*. "Lamprey."*Petromyzon americanus* Storer. Synopsis Fishes N. A., p. 265.

PETROMYZON NIGRICANS *Lesueur.*

*Petromyzon nigricans* *Storer.* Synopsis Fishes N. A., p. 265.

Genus ICHTHYOMYZON *Girard.*

ICHTHYOMYZON APPENDIX *Girard.*

*Petromyzon appendix* *Storer.* Synopsis Fishes N. A., 266.

Order *HYPEROTRETI* (Bon.)

Family MYXINOIDÆ (Müller.)

Subfamily MYXININÆ (Bon.)

Genus MYXINE *Linn.*

MYXINE GLUTINOSA *Linn.*

*Myxine glutinosa* *Fabricius.* Fauna Grœnlandica, p. 344, No. 334.

MYXINE LIMOSA *Girard.\**

*Myxine limosa* *Girard.* Proceedings of the Academy of Natural Sciences of Phila., 1858, p.

Order *PHARYNGOBRANCHII* (Müller.)

Family BRANCHIOSTOMOIDÆ (Bon.)

Subfamily BRANCHIOSTOMINÆ (Bon.)

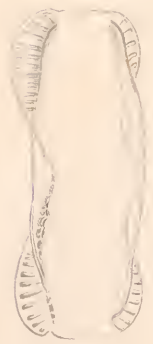
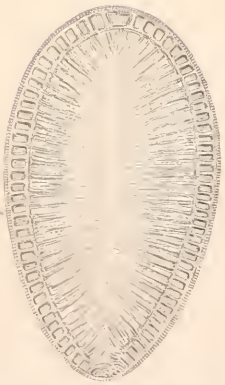
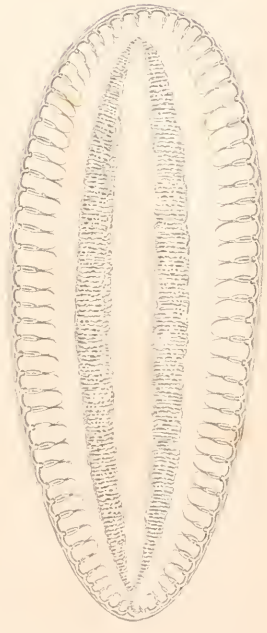
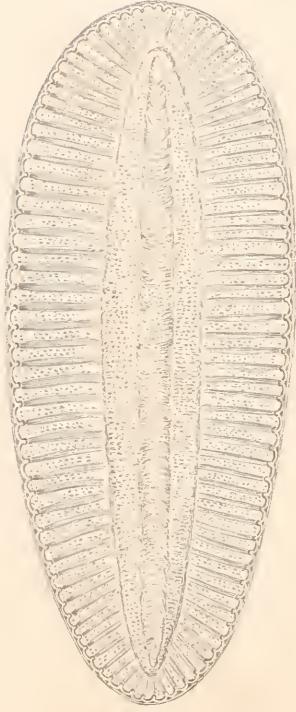
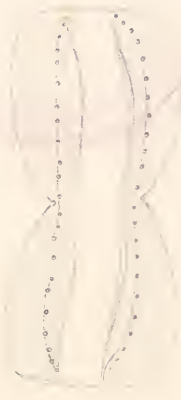
Genus BRANCHIOSTOMA *Costa.*

BRANCHIOSTOMA sp.



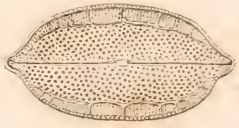




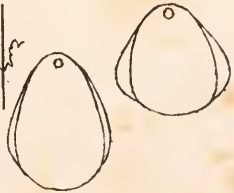
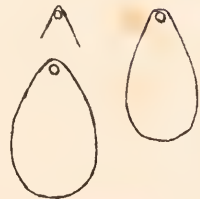
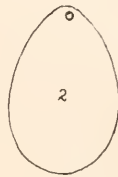




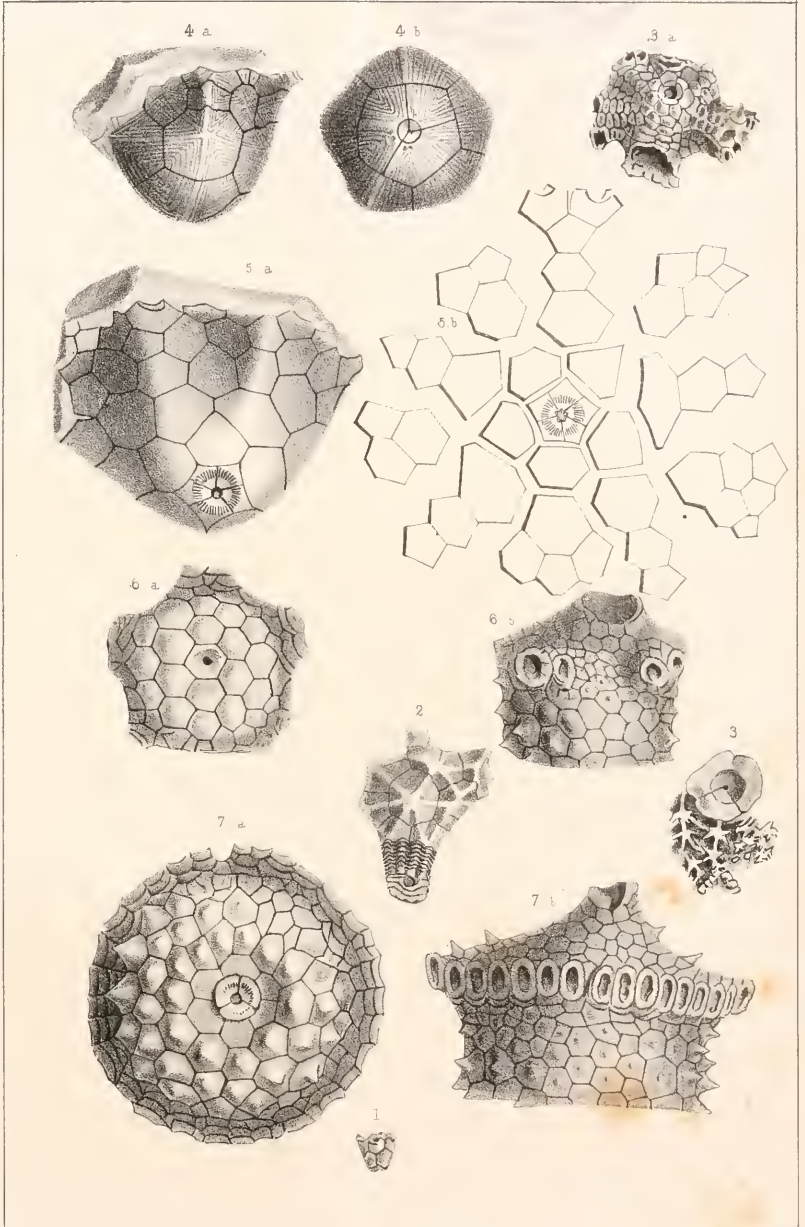
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