PROCEEDINGS

OF THE

ACADEMY OF NATURAL SCIENCES

OF PHILADELPHIA.

1863.

January 6th.

Vice-President BRIDGES in the Chair.

Fifteen members present.

January 13th.

MR. JEANES in the Chair.

Eleven members present.

January 20th.

Vice-President VAUX in the Chair.

Eleven members present.

On motion, a vote of thanks was tendered to Mr. B. F. Saurman for a collection of mounted, native birds, presented by him this evening to the Academy.

January 27th.

The President, Mr. LEA, in the Chair.

Twenty-two members present.

On report of the Committee the following paper, read December 23d, 1862, was ordered to be published:

Descriptions of FOSSILS from the Yellow Sandstones lying beneath the "Burlington Limestone," at Burlington, Iowa.

BY ALEXANDER WINCHELL.

With the view of collecting facts bearing upon the determination of the geological age and equivalents of certain ferruginous sandstones in the lower peninsula of Michigan, which I have provisionally designated the Marshall Group,* I visited several of the neighboring States during the past summer, for the purpose of examining the principal exposures of strata supposed to occupy nearly the same horizon. At Burlington, Mr. C. A. White accompanied me in all my examinations, and enabled me to procure nearly a complete suite of the species of that place described by Shumard and Hall, but more especially by himself and Mr. R. P. Whitefield.† Besides the recognized species, I obtained from Mr. White, or by his assistance, several undescribed forms. Subsequently Mr. White greatly increased the number of unknown species by his discoveries at exposures hitherto but little explored. The whole collection of new species, together with his own observations thereon, has been kindly placed in my hands for investigation; and the following paper is the result of this study.

The number of new species herein described is fifty-nine, and the number now first identified, ten. The number of species previously known from these rocks was sixty-six,‡—a total which is now raised to one hundred and thirty-five.

The richness of this locality in fossil species is well worthy of note. To the one hundred and thirty-five species from the yellow sandstones must be added three hundred and seven species from the overlying Burlington limestone, making a grand total of four hundred and forty-two species from a single locality. It ought not to be forgotten, that this wonderful result has been developed mainly through the industry and skill of a single individual,—Charles A. White,—who, during eight years of his residence in the locality, has collected the types of two hundred new species and six new genera.

A consideration of the general conclusions deducible from the study of the palæontology of the rocks of the Western States supposed to occupy the horizon of the Marshall Group of Michigan will be hereafter presented. Suffice it to say, on the present occasion, that no one can glance over the list of species described here and elsewhere from these rocks without admitting that the *ensemble* bears a very close analogy with that of the "Mountain Limestone" of the Old World, and raising the inquiry *how* the equivalent of the old red sandstone can lie on the *top* of such an assemblage of strata.

Descriptions of New Species and Genera.

LEPTOPORA, n. gen.

Etymology, Λεπτος, *shallow* and πορα, *a cell.*

Corallum occurring in thin discoidal masses; cells very shallow, crowded, polygonal, separated by a common cell-wall, which is vertically striated; interior of cells filled with a finely vesicular tissue; cups polygonal, concave, elevated in the centre, and displaying numerous radial lamellæ.

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* See "First Biennial Report" of the Geological Survey of Michigan, 1860. For descriptions of the fossils of this group, see Silliman's Journal, [2,] vol. xxxiii. p. 352, and Proc. Acad. Nat. Sci. Phila., Sept., 1862, p. 405—430.

† For White's descriptions, see Jour. Bos. Soc. Nat. Hist., vol. vii., and Proceedings of same, vol. ix. p. 28, et seq. For White and Whitefield's descriptions, see "Proceedings," vol. viii. p. 289.

‡ In this estimate I omit *Chonetes Logani*, Norwood and Pratten, (not Hall,) *Cardiomorpha ovata*, Hall, and *Cardiomorpha parvirostris*, White, for reasons which will appear in the sequel. *Productus Shumardianus*, Hall, as recognized at Burlington, appears to be *P. concentricus*, Hall. and *Avicula circulus*, Shumard, as recognized at Burlington, is probably *Aviculopecten limæformis*. White and Whitefield.

LEPTOPORA TYPA, n. sp.—Polypary subcircular in outline, and slightly convex on the general surface; composed (in the specimens examined) of 25–30 rather large cells, of which the internal ones are hexagonal, and the peripheral rounded exteriorly; margins of cups strongly elevated; radial lamellæ about 20.

Diameter of mass ·72,* diameter of the cells about ·14, and their depth about ·07. In a specimen whose diameter is 1·27, the diameter of the cells is ·22.

Ranges from the oölitic bed No. 6 into the base of the Burlington limestone.

This singular coral is not as well known as is desirable. Though discoid, it does not seem to be encrusting. No diaphragms or communicating pores have yet been detected.

TREMATOPORA, Hall.

TREMATOPORA? VESICULOSA, n. sp.—Corrallum delicate, terete, branching, celluliferous on all sides. Cells arranged in spiral and often longitudinal series; cell-mouths oval, slightly elevated on the lower margin, the longitudinal series more or less separated by a straight or flexuous, sharply-raised carina. Surface between the cell-mouths imperforate, but the substance of the corallum beneath is irregularly vesicular. No solid axis exists, the cells appearing to ascend and diverge gradually from an imaginary axis.

Diameter of stem about ·05; length and breadth of cell-mouth ·02 and ·01; distance between the cell-mouths in the spiral series ·01. In some specimens the cell-mouths are somewhat more widely separated.

Base of the Burlington limestone and in the fine-grained sandstone of Ohio.

TREMATOPORA? FRAGILIS, n. sp.—Corallum delicate, branching, terete or slightly compressed at the bifurcations, celluliferous on all sides. Cell-mouths minute, oval, somewhat remote, not disposed in regular series, more approximate in a transverse than in a longitudinal direction. Intervening surface imperforate; the substance immediately beneath minutely cellular.

Least distance between contiguous cell-mouths about equal to their transverse diameter; greatest distances two or three times as great. The absolute dimensions of the cell-mouths are less than in the last species.

Base of the Burlington limestone.

The two species above described are only provisionally referred to *Trematopora*. They belong to a group often ranged under *Millepora* and *Ceriopora*, but apparently without sufficient reason. The assemblage of branching (or sometimes foliaceous) corals without septa or lamellæ, ranging from the lower Silurian into the Carboniferous limestone, seems to be but imperfectly understood; and the generic and even more fundamental relations are in a state of very unsatisfactory vagueness and confusion.

LINGULA, Bruguière.

LINGULA MEMBRANACEA, n. sp.—Shell flattened, quadrate-ellipitical, nearly as broad near the beak as at the same distance from the anterior margin; length nearly equal to twice the width; lateral margins slightly curved; beak scarcely elevated, near the posterior margin, but with a narrow belt behind it. Shell substance membranaceous, marked externally by very delicate, regular concentric lines.

Length ·50 (100); breadth in the middle ·32 (64); breadth at one-fourth the shell-length from posterior end ·28 (56); breadth at same distance from anterior end ·31 (62).

Differs from *L. concentrica*, Hall, from the Genesee slate by its subequal

* The measurements in this paper are given in inches. Where one number is followed by another in parenthesis, the latter is the relative measurement—the dimensions which is generally the greatest being assumed 100

width at the two extremities. A similar undescribed species occurs in the "fine-grained sandstone" of Ohio.

DISCINA, Lamarck.

Discina patellaris, n. sp.—Upper valve circular, elevated, patelliform, with a subcentral beak, from which the surface slopes in right lines to all parts of the margin, except a barely perceptible concavity down the posterior slope. Surface (of cast) with feeble concentric striæ.

Diameter ·90 (100); height of upper valve ·33 (37); The length appears to be a very little greater than the breadth, but the specimen is slightly defective posteriorly.

This species recalls *D. Alleghania*, Hall, of the Chemung Group, but the apex is more central, and the concentric lines less lamellar and regular, and the shell, so far as known, is smaller.

PRODUCTA, Sowerby.

Producta ? parvula, n. sp.—Shell very small, semi-elliptic or nearly semicircular in outline, with a hinge-line equalling the greatest width, or a little less. Ventral valve ventricose, with regular, though slightly diminishing curvature from beak to anterior margin, describing an arc of about 180°; beak elevated above the hinge-line and incurved over it; flanks regularly convex, abruptly flattened and auriculate at the hinge extremities. Dorsal valve unknown. Surface ornamented with small, rigid, continuous, radiating ribs, which on the sides increase by implantation.

Length from beak to anterior margin ·38 (100); width ·31 (82); depth of ventral valve ·23 (61). The prevailing dimensions are less than the above.

Amongst *Productæ* of similar age the miniature size of the present species renders it at once distinguishable. The specimens look like pygmy examples of *P. cora*, *arcuata* or *pileiformis*.

Producta Martini, (Sow.) de Kon. (*P. semireticulatus*, Martin.)—In the wide range of characters admitted into this species, as defined by de Koninck, there is little doubt that the Burlington specimens would be embraced. Although most of the American species of *Producta* formerly identified with European types have subsequently been separated, *P. Martini* (or *semireticulatus*) is still admitted to exist in our coal measures; and it seems probable that its first appearance dates considerably further back.

Ranges from the bottom of the Yellow sandstones into the Burlington limestones.

Producta speciosa, Hall, (Tenth Ann. Rep. Reg. N. Y., p. 176).—Several casts of this Chemung species present the appearance of being inside views of very concave dorsal valves; but no internal structures are visible. The beak is flattened, and not elevated above the hinge-line, which is somewhat shorter than the greatest width of the shell. The other characters also agree.

STROPHALOSIA, King.

Strophalosia ? nummularis, n. sp.—Shell of medium size, circular, truncated by the hinge-line. Hinge-line (generally much) shorter than the greatest width of the shell. Ventral valve comparatively very shallow, regularly arching from the anterior side to the vicinity of the beak, which is obtuse, not incurved and not elevated above the dorsal margin; surface depressed each side of the beak; area apparently present, but very narrow. Dorsal valve discoid, with a broad, shallow umbonal depression, which is bounded on the two sides by lines diverging from the beak at right angles with each other, or nearly so; beak depressed, furnished with a small bifid cardinal process or boss, which lies in the plane of the valve and projects beyond the hinge-line; each branch of the boss continued internally in a low vanishing ridge, which is turned outwardly into the position of a socket ridge, but without the socket behind it;

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median septum a low ridge appearing a short distance from the beak, and disappearing toward the middle of the valve; vascular imprints sectoriform reaching half way to the midvalve, separated from the median septum by a faint ridge (occlusor apophysis ?) on each side. External surface of both valves with numerous concentric lamellar striæ and innumerable little pits which give the impression a finely granular appearance; pits more scattered and deeper toward the anterior margin. Internal surface (of dorsal valve) exhibiting concentric lines and innumerable raised points, apparently corresponding with the pits of the exterior.

Length ·82 (100); width 1·06 (129); length of hinge-line ·55 (67); length of cardinal process ·04 (5); depression of dorsal valve ·04 (5). Depth of ventral valve ·15, with a length of ·76. Another dorsal valve has a width of 1·46 and a hinge-line 1·22 long.

This anomalous species has more the form of an *Orthis* or *Strophalosia* than a *Producta*. But there is no positive proof of the existence of spines, and the somewhat doubtful existence of an area in either valve furnishes only unsatisfactory grounds for referring it to either genus. At the same time it is difficult to understand how the externally projecting cardinal processes of the dorsal valve could be used without a fissure (and area?) in the ventral valve in which they could move. In view of all the facts, I venture to refer the species with a query to Strophalosia. Should the reference prove correct, it will be, so far as I know, the first identification of this genus in American rocks.

CHONETES, Fischer.

Chonetes multicosta, n. sp.—Shell of medium size or larger, semicircular, with the greatest width along the hinge-line. Ventral valve depressed-ventricose, more or less flattened toward the hinge extremities, with a barely perceptible mesial sinus reaching two-thirds the distance to the flattened inconspicuous beak; spines two (possibly three) each side of the beak, nearly at right angles with the hinge-line, of medium length, rather stout, the first midway between the beak and cardinal extremity, the second midway between this and the same point; area extremely narrow. Dorsal valve shallow, concave, with a depressed mesial fold extending nearly to the beak; socket plates very divergent; occlusor scars forming a very small elleptic pit near the beak. External surface of each valve bearing 180–200 fine, subflexuous, radiating striæ, which increase dichotomously at all distances from the beak, and sometimes also by implantation. Surface of cast rather remotely punctate.

Length of hinge-line ·82 (100); length of shell ·50 (61); convexity of ventral valve ·12 (14). In most specimens the last measure is relatively less.

Ranges from the base of the yellow sandstones into the base of the Burlington limestone. Intermediate in size between *C. Logani* and *C. Fischeri* of Norwood and Pratten. It possesses a greater number of radiating striæ than *C. Illinoiensis* of Worthen.

Chonetes Illinoiensis, Worthen, (Trans. St. Louis Acad. Nat. Sci., i. 571;) C. Logani, Hall, (Iowa Rep. p. 598, pl. xii. fig. 1, a–e and 2,) not *C. Logani*, Norwood and Pratten, (Jour. Acad. Nat. Sci. Philada., [2] iii., p. 30, pl. ii. fig. 12, *a*, *b*, *c*.)

Some confusion seems to exist among the species of *Chonetes* just mentioned. *C. Logani* was described "from the middle portion of the mountain limestone series," at Burlington, Iowa, and characterized as having "about 30 rugose ribs." The figure agrees with the description. Prof. Hall subsequently described a species from the Burlington limestone, of Burlington and Quincy, which he referred to *C. Logani*, Nor. and Prat., though, among the characters, he assigns to it "100–120 or more fine rounded dichotomizing striæ." Still later, Mr. Worthen, conceiving this form to be specifically distinct, gave it the name of *C. Illinoiensis*, remarking that it "is restricted to the crinoidal beds of the

mountain limestone," being abundant at Quincy, Ill., and intimating that Norwood and Pratten had erroneously assigned their species to the mountain limestone, in consequence of supposing all the Burlington rocks to belong to that series. The "middle portion of the mountain limestone series," however—even as then understood—would be found far above the yellow sandstones at Burlington. Moreover, in referring *C. Fischeri* to these sandstones at the same locality, they place them "at the base of the mountain limestone." It seems clear, then, that *C. Logani* belongs to the Burlington limestone, but that nevertheless, the species described by Hall cannot be the same, and has been properly separated as *C. Illinoiensis*. The latter species, however, contrary to Mr. Worthen's opinion, occurs frequently in all the beds below the Burlington limestone—having a range co-extensive with that of *C. multicosta*.

SPIRIGERA, (d'Orbigny,) Billings.

SPIRIGERA CORPULENTA, n. sp.—Shell of medium size, extremely ventricose, varying in outline from oval to orbicular-oval. Ventral valve depressed from the anterior margin to the summit of the greatest gibbosity, which is two-thirds the distance to the beak; anterior margin rather deeply sinuate, or very slightly so, sinus soon disappearing in a mere flattening of the valve, or traceable backwards, in a narrow shallow groove, as far as the middle of the shell; umbonal region extremely inflated; beak abruptly turned toward the opposite valve, not produced, truncate, circularly foraminated. Dorsal valve extremely ventricose near the anterior margin, slightly elevated in a mesial fold traceable to the most gibbous region, which is less than half way to the beak; surface depressed between this region and the beak; beak inconspicuous, covered by its fellow. External surface of casts strongly marked by numerous lamellose wrinkles of growth.

Length ·80 (100); breadth ·70 (87); depth of both valves ·58 (72). Breadth and depth of another specimen ·75 and ·68.

The aspect of typical specimens is exceedingly unique. The great gibbosity of the rostral region of the ventral valve and the anterior region of the dorsal, causes the line of junction of the two valves to pass *diagonally* from the anterior to the posterior region. The lateral edges of the two valves, moreover, lie in the same plane, so that the sides of the shell present a regular convexity, like the dorsal and ventral surfaces, and the lines of growth of the two valves, diverging from the postero-lateral region complete the illusion of a dorsal or ventral surface radiately ribbed.

SYRINGOTHYRIS, n. gen.

Etymology, σῦριγξ, *a tube* and θυρίς, *a window*.

Shell with an elongated hinge-line. Ventral valve with a mesial sinus, a very broad area, and a narrow triangular fissure closed toward the apex by an external, convex pseudo-deltidium, beneath which, and diverging from it, is another transverse plate connecting the vertical dental lamellæ, arched above, and beneath giving off a couple of median parallel lamellæ, which are incurved so as to nearly join their inferior edges—thus forming a slit-bearing tube, which projects beyond the limits of the plate from which it orginates into the interior of the shell. A low median ridge extends from the beak to the anterior part of the valve. Dorsal valve depressed, without area, with a distinct mesial fold. Shell structure fibrous.

The elevated ventral and deficient dorsal area of this genus, not less than its external pseudo-deltidium, of one piece, ally it to *Cyrtia*, Dalman, and *Skenidium*, Hall. It is not known whether the arms were furnished with calcareous spiral supports, though the general aspect of the shell is that of a *Spirifera*. The shell substance is impunctate in all conditions and under high powers.

Some difficulty exists in deciding on the homology of the transverse plate and fissured tube which characterize this genus. In the ventral valve of *Merista*,

especially of the type of *Camarium*, Hall, an arching lamella arises from the basal portion of each dental plate, and the two unite in the mesial line of the valve, forming a structure which Prof. King, before the separation of this genus, had styled the shoe-lifter process,—arched in front, and attached to the bottom of the valve behind. In *Spirifera granulifera*, Hall, a horizontal transverse plate stretches across the middle of the beak of the ventral valve, connecting the dental lamellæ where nearest approximated by their inward curvatures,—a stucture which probably represents the pseudo-deltidium of certain *Spiriferæ*, but not of *Cyrtia*. Beneath this plate, the ventral medium septum assumes the form of a tapering cone, resting with its base filling the cavity and having the anterior part of the upper side marked by a longitudinal groove or slit, while the posterior part sends up a small vertical plate to the transverse plate just mentioned. In *Syringothyris*, the transverse plate equally connects the dental lamellæ where most approximated, and is somewhat arched upward, as in *Merista*, but it does not join the bottom of the valve as in that genus, nor is it connected with the median septum as in *Spirifera granulifera*. Nevertheless it would seem that the three structures are modifications of the same elements.

But what is the element thus modified? Prof. King suggested that the shoe-lifter process of *Cleiothyris concentrica* is a modified form of the ventral median plate; but the wide separation of its points of origin from the normal position of this plate seems incompatible with such a conclusion; while in *Syringothyris* and *Spiriferæ granulifera* the median plate exists independently of the apparent homologue of the shoe-lifter. Mr. Billings, whose observations are generally marked by extreme sagacity, regards the shoe-lifter "as an abnormal form of the pseudo-deltidium that occurs in some Spirifers." This is the relationship pointed out above; and there seem to exist good morphological reasons for regarding the fistuliferous arching plate of *Syringothyris* as a modified pseudo-deltidium. But to what does the latter structure appertain? In *Merista*, *Syringothyris* and certain *Spiriferæ* its relation to the dental plates suggests that it may be an outgrowth of those parts. The dental plates are amongst the most heteromorphous structures of the ventral valve. From a normal erect position, they become approximated along the ventral margins in many *Spiriferæ* and other genera, while in *Pentamerus*, *Orthisina* and *Camarophoria* this approximation results in complete union, and in *Leptæna* in the formation of the saucer-shaped process of the ventral valve. They also vary excessively in longitudinal development. In many *Spiriferæ*, moreover, there is an evident indication of a longitudinal folding of the dental plates, producing on one side or the other a longitudinal laminar process, which, under an extraordinary development, may coalesce with some neighboring part. While, therefore, the shoe-lifter process of *Merista*, and still more the fistuliferous diaphragm of *Syringothyris*, may be but modifications of the false inner deltidium of *Spirifera granulifera*, the three structures—accidental among Palliobranchs—may be but mere outgrowths of the essential and typical parts known as dental plates.

The geological range of the above generic type is, as far as known, only from the base of the yellow sandstones at Burlington, Iowa, to the Keokuk limestone. The species from the latter horizon cannot at present be characterized. There are reasons for believing that *Spirifer extenuatus*, Hall, from the yellow sandstones at Burlington, will yet be found to possess the same peculiarities, if it is not a variety of one of the following species.

SYRINGOTHYRIS TYPA, n. sp.—Shell large, thin, externally destitute of radiating ribs, or showing them but faintly. Ventral valve with a broad, undefined, rather shallow sinus; beak extremely elevated; slope thence nearly straight to all parts of the margin; area very large, triangular, flat, forming an angle of about 30° with a line along the bottom of the sinus, and perforated by a rather broad triangular fissure. Dental plates diverging at an angle of 30°, continued nearly to the apex of the beak, and extending anteriorly beyond the middle of the valve. Attachments of the myary system unknown.

The external characters of this shell resemble those of *Spirifera simplex*, Phil. (Pal. Foss. p. 71, pl. xxix. fig. 124, and pl. lx. fig. 124), but the hinge-line is more elongate.

This species, so far as is certainly known, is restricted to the base of the Burlington limestone.

Syringothyris Halli, n. sp.—Shell of medium size, transversely elongate, widest along the hinge-line; greatest depth of the two valves equalling or exceeding the greatest length. Ventral valve with a deep, defined sinus; beak very elevated; surface sloping thence with but little convexity, to all parts of the margin,—being sometimes even concave between the apex and the cardinal extremities; area large, triangular, transversely striate, flat or slightly arched, with a more marked incurvation just beneath the beak; perforated by a narrow, or moderately wide, triangular fissure, which is grooved along its lateral borders as if for the reception of a deltidium; dental plates rather short—in a variety, very short—diverging at an angle of 66°; mesial septum a low ridge extending two-fifths the length of the valve; line of divaricator scars extending with a curve from inner end of dental plates to inner end of mesial septum. Dorsal valve moderately ventricose, with a convex surface, and abrupt well-defined mesial elevation, and a small beak which overhangs the base of the fissure in the area of the opposite valve,—the area being scarcely perceptible in the dorsal valve. Surface ornamented by 12 to 16 rounded ribs on each side of the mesial fold and sinus, becoming obsolete toward the lateral angles. Mesial fold and sinus destitute of ribs. The whole surface is further marked by faint, delicate lines of growth.

Length of hinge-line 1·32 (100); depth from beak of ventral valve to most prominent point of dorsal—which is nearly at right angles to the plane of the valves—·70 (53); distance from hinge-line to middle of anterior margin ·54 (41); elevation of (ventral) area ·48 (36); width of fissure at base ·28 (21).

Ranges through the yellow sandstones. In bed No. 1 is a variety with somewhat convex area, very narrow fissure and very short dental plates. The species occurs also at Clarksville, Mo., where the beak of the ventral valve is bent somewhat to the left (this beak being uppermost) in the style of a *Streptorhynchus*, producing a curvature of the mesial sinus and the fissure; and is further peculiarly marked by several distinct lamellar wrinkles of growth.

Named in honor of Prof. James Hall, the eminent Palæontologist of Albany, N. Y.

AVICULA, (Klein,) Bruguière.

Avicula Whitei, n. sp.—Shell large, transverse, exceedingly oblique, with nearly terminal beaks. Hinge-line more than three times the greatest dorso-ventral dimension. Anterior ear pouched, not distinctly divided from the body of the shell. Left valve ventricose; umbonal ridge somewhat arcuate, or nearly straight, forming an angle of about 20°, with the hinge-line; slope thence to the ventral margin very rapid—to the dorsal side rather gradual and symmetrical to the very hinge-line—the posterior wing not being divided from the body of the shell. Ventral margin, in the middle rather straight and nearly parallel with the dorsal; posterior margin sigmoidal by a deep, or rather shallow sinus, isolating the posterior end of the cartilage plate from the body of the shell; posterior wing triangular, exceeding the shell. External surface marked by numerous fine, irregular striæ of growth. Right valve much less ventricose, marked on the body and anterior slope by numerous sharp, regular raised concentric striæ which become very faint posteriorly. Cardinal line in each valve with a long, slender, bifid lateral tooth behind the beak.

Length of dorsal side 2·13 (100); greatest dorso-ventral dimension ·70 (33): depth of left valve ·22 (10).

Avicula acanthoptera, Hall, (Geol. Rep., 4th Dist. N. Y., p. 263).—Shell

rather large, very oblique, becoming distinctly arcuate upwards. Left valve very ventricose, with a tapering, incurved beak, closely approximated to its fellow; body of valve regularly arched along the umbonal slope, from which line it describes a rapid convexity to the anterior margin, sloping more gradually to the ventral margin and becoming gradually flattened toward the posterior ventral angle. The upper boundary of the body is an abrupt descent to the plane of the posterior wing, and sharply divides the two; posterior wing sloping to the dorsal and posterior borders of the valve, produced above into a slender spine, nearly as long as the posterior end of the shell, with a deep sinuation below. Anterior ear short, saccate, less distinctly divided from the body of the valve. Hinge-line straight, with a long, posterior cartilage facet. Surface marked by irregular wrinkles of growth which become fine striæ on the posterior wing, and sharp plications on the anterior slope and auriculation. Right valve smoother and considerably less ventricose, with the posterior wing-surface divided from the body of the valve only by a slight groove.

Length from beak to extremity of posterior wing ·81; from beak to extremity of anterior wing ·21; from middle of dorsal side to ventral side ·70; greatest width of body of shell ·48; same width in a larger specimen ·93; depth of right valve of same specimen ·30.

An occasional specimen of this species, differing from the types of the above description only in the absence of arcuation of the body, presents a good agreement with Prof. Hall's figure and brief diagnosis,—diverging only in the less forward direction of the beak, in the much larger anterior ear, and deeper byssal sinus beneath it. The prevailing forms greatly resemble *Avicula lunulata*, Phil. sp. (Geol. Yorks, ii. pl. vi. fig. 12). It is, however, less oblique, especially in the earlier stages of its growth, and the beak is narrower and more depressed. It is also considerably broader on the antero-ventral side, and has a larger posterior wing.

AVICULOPECTEN, McCoy.

Aviculopecten Caroli, n. sp.—Shell of medium size, subcircular, ventricose. Hinge-line shorter than the shell; anterior ear of right valve shorter than anterior end of shell, rounded, slightly inflated, with a deep, sharply-rounded notch below; posterior ear acute, slightly longer than the anterior, with a broad, shallow notch below; shell otherwise nearly equilateral. Beak central, inconspicuous; greatest convexity of valve a little above the middle. External surface of the body of the valve marked by about 25 nearly equidistant, narrow, sharply-raised, radiating ribs, with two or three fine, raised striæ in each of the interspaces; a set of very fine, sharp, close, concentric raised lines cross the smaller ribs, but are intercepted by the primary ones. The latter, however, show a tendency, toward the pallial margin of the valve, to develope nodes, which, on the anterior and posterior slopes, become distinct spines. The spines sometimes occur in the spaces between the primary ribs. The wings are also marked by two sets of raised lines, but on the posterior wing the radiating set is most prominent, while on the anterior wing the concentric set is strongest. The left valve is exactly like the right, except that the notch below the anterior ear is shallower.

Length from beak to ventral margin ·66 (100); length of hinge-line ·55 (83); convexity of right valve ·20 (30); antero-posterior dimension ·66 (100). Number of concentric lines in one-tenth of an inch, 16. The adult size of the species seems to be about one inch in length and breadth.

Ranges from the base of the yellow sandstones into the base of the Burlington limestone.

Aviculopecten occidentalis, n. sp.—Shell small, appressed; hinge-line equal to greatest width; anterior and posterior umbonal ridges at right angles, and straight to the middle of the shell extremities, between which the pallial

margin is regularly curved. Wings distinct, the anterior slightly inflated, rounded at the extremity, and separated from the body of the shell by a rather acute notch, from which a furrow extends to the beak; posterior wing flattened, acute, subtriangular, with a shallow sinus below. Body of shell smooth; wings with radiating ribs, strongest on the anterior wing and crossed by equally strong concentric lines; posterior wing with fine concentric lines.

In the oölitic limestone ("No. 3" of White.)

Aviculopecten tenuicostus, n. sp.—Shell small, equilateral; pallial margin circularly rounded between anterior and posterior extremities, which lie midway between the beak and opposite side. Beak slightly prominent; body of shell bounded by a truncation from beak to each lateral margin; anterior truncation slightly concave. Anterior wing of left valve moderately inflated, as long as anterior side of shell, distinctly rounded at extremity, joining hinge-line by a rounded angle, and separated from body of shell by a broadly V-shaped sinus, rounded at the bottom. Posterior wing only very imperfectly seen. Surface (of left valve) ornamented by fine, rigid, nearly equidistant ribs, 50 or 60 in number, separated by concave intervals; similar but finer ribs or striæ marking the anterior ear. Frequently from three to five equidistant costate elevations appear, each of which bears two or three of the ribs. A few inequidistant concentric lines are seen. Right valve unknown.

Length from beak to opposite side ·47; antero-posterior dimension the same.

It is a little singular that of seven specimens of this species all are left valves, showing only the anterior ear. The posterior is probably flat and thin.

POSIDONOMYA, Brown.

Posidonomya? ambigua, n. sp.—Shell of medium size, rather ventricose, somewhat oblique. Hinge-line short, straight, not surpassed by the inconspicuous beak, abruptly rounded at the extremities; sides of shell subparallel, somewhat straight; ventral margin circularly curved, gaping at the antero-ventral angle. Cast nearly smooth, but bearing the impression of a few small, irregular wrinkles around the margin.

Greatest dimension (from beak to ventral margin) ·65 (100); antero-posterior dimension ·58 (89); angle of umbonal slope with hinge-line 70°.

Three left valves and one right, of an anomalous fossil are here referred with great uncertainty. One of the specimens is larger and relatively longer from beak to venter than the one described, and seems to have been everted around nearly the entire pallial border, producing an extensively gaping shell. The right valve is a smaller specimen, with the beak near the anterior extremity of the hinge-line, and presenting the anomaly of a forward instead of a backward obliquity—in this respect resembling *Streblopteria*, McCoy, but without the anterior wing. The three valves could scarcely belong to the same species of any genus, but it would be folly to attempt a further discrimination at present.

DEXIOBIA, n. gen.

Etymology, *δεξιός*, *on the right side* and *βια*, *strength*, in allusion to the greater ventricosity of the right valve.

Shell thin, inequivalve, inequilateral; beaks separated by an undefined area. Right valve very ventricose, with a very prominent umbo, and a produced, incurved beak, strongly inclined forward. Left valve much less inflated, with a less prominent beak, scarcely elevated above the dorsal margin. Hinge-line more or less extended, straight, or slightly bent, edentulous (?) furnished with a thickened cartilage plate bearing a linear posterior groove. Pallial line and muscular markings unknown.

In his Report on the Geology of Iowa, (p. 522, pl. vii. fig. 10, a, b, c,) Prof. Hall has described, under the name of *Cardiomorpha ovata* (not *C. ovata*, d'Orb.

= *Mactra ovata*, McCoy,) a common species from the yellow sandstones of Burlington. This species Messrs. Meek and Worthen supposed to be congeneric with their *Cardiopsis radiata*, (Proc. Acad. Nat. Sci. Phil., June, 1861, p. 144). From the same beds, Mr. C. A. White has more recently described a similar species under the name of *Cardiomorpha* (*Cardiopsis?*) *parvirostris*, (Proc. Bos. Soc. Nat. Hist., Jan., 1862, p. 31), which has the small beak and Luciniform aspect of several other species referred by authors to the same genus * It was some time since remarked, however, by Mr. White, that amongst all his specimens of these two species, the left valves of *C. ovata* and the right valves of *C. parvirostris*, were entirely wanting. It appears also that Prof. Hall's description was drawn from a right valve. The idea, however, that the two sets of valves might really belong to one species, would not probably have been entertained but for the discovery of a specimen with both valves in closely fitting juxtaposition. On one side the specimen is *C. ovata*, on the other *C. parvirostris!* The beaks of the two valves are wanting, but the ventral margins apply to each other with exactitude,—the number of radiating lines in a given distance being the same on the two sides.

From the same exhaustless deposits of fossil remains, Mr. White's industry has brought to light some other forms which present similar characteristics.

It is evident that these fossils cannot be referred to any known genus. It is doubtful whether they fall within the limits of any recognized family assemblage. Judging from their analogies, they must have been asiphonal, integropallial Pleuroconchs, though little evidence of the possession of a byssus has been detected. From the inequivalve family *Aviculidæ* (including *Aucella*, to which they are most related,) they are clearly excluded by the greater ventricosity of the *right* valve, and the absence of an anterior wing and byssal sinus. From the free inequivalve *Ostreidæ* their great gibbosity distinguishes them. From *Dolabra*, McCoy, they differ in the greater ventricosity of the right valve and less transverse shape.

In view of the facts above recited, though some palæontologists may not regard them as sufficiently conclusive, I have ventured to publish a diagnosis of the supposed new genus.

Dexiobia Whitei, Winchell, (= *Cardiomorpha ovata*, Hall. + *C. parvirostris*, White.)—Shell subrotund, with a slight anterior obliquity caused by a moderate protrusion of the antero-ventral border, from which, in the right valve, a slight elevation extends to the beak; anterior margin rather straight above. Hinge-line short, regularly curved; beaks nearly central. Surface marked by fine radiating ribs—becoming obsolete toward the umbo—and numerous irregular concentric wrinkles, which are generally most conspicuous in the left valve.

Height from beak to middle of ventral margin 1·26 (100); greatest anteroposterior dimension, nearly bisecting the first measure, 1·16 (92); convexity of right valve ·45 (35). Height of another specimen 1·67. Height and convexity of a left valve 1·19 (100) and ·26 (22).

Dexiobia Halli, n. sp.—Shell small, semi-elliptic, subequilateral. Hinge-line straight, extended; in some specimens as long as the greatest width of the shell. Right valve extremely ventricose, flattened and subalate toward the hinge extremities; left valve with a very small obtuse beak, and slender posterior cartilage plate bearing a longitudinal median furrow. Surface smooth.

Height from beak of right valve to middle of ventral side ·65 (100); length of hinge-line ·76 (117); ventricosity of right valve ·35 (54).

MYTILUS, Linnæus.

Mytilus Whitfieldianus, Win., (Proc. Acad. Nat. Sci. Phil., Sept., 1862, p.

* Compare also *Lucina? retusa*, Hall, (Geol. Rep. 4th Dist., N. Y., p. 245), and *Ungulina suborbicularis*, (Ib. p. 243).

413.)—The small shells thus identified have heretofore been regarded as the young of *M. occidentalis*, White and Whitfield,—a species with which I formerly identified the Michigan types of *M. Whitfieldianus*,—a close comparison of specimens, however, shows *M. occidentalis* to be quite destitute of the fine diverging striæ which belong to perfect specimens of the other species. *M. occidentalis*, moreover, is more flattened between the umbonal ridge and the hinge-line, and does not attain more than one-fifth the length of the other. It bears considerable resemblance to *Modiola lingualis*, Phil., (Geol. Yorks. p. 209, pl. v. fig. 21.)

ORTHONOTA, Conrad.

Orthonota phaselia, n. sp.—Shell transversely quadrangular. Beaks inconspicuous, nearly terminal, not raised above the slightly-curved hinge-line. Ventral margin subparallel with dorsal, with a shallow sinuation in the middle. Posterior end truncately curved, a little the most extended toward the dorsal side; anterior end slightly produced below, with a deep lunette above. Shell inflated from the anterior end to near the posterior. Greatest thickness a little in front of the middle. Anterior muscular pit shallow, ovately pyriform. Surface with a few remote concentric lines near the border.

Length ·35 (100); height ·20 (57); thickness of both valves ·13 (37).

EDMONDIA, de Koninck.

Edmondia nitida, n. sp.—Shell small, equivalve, suborbicular, ventricose, slightly oblique, with a subcentral beak. Hinge-line slightly extended posteriorly, obtusely rounded at the extremities; anterior and posterior sides subparallel; ventral border circularly rounded, but a little produced in the line of the umbonal ridge. Beak elevated above the hinge, obtuse, slightly incurved; umbonal ridge making an angle of 68° with the hinge-line; behind this ridge the slope is abrupt to the posterior border; middle portion of the shell very slightly flattened from the beak along the region anterior to the umbonal ridge. Surface handsomely marked by rigid, regular concentric raised striæ, with a few remote, irregularly-distributed concentric furrows. The striation is preserved in all its sharpness to the very hinge-border.

Length ·59 (100); height ·59 (100); thickness of both valves ·30 (51).

Closely resembles *E. unioniformis*, de Kon., (Anim. Foss., pl. i. fig. 4,) but the latter is less finely and elegantly striated, and shows no flattening along the region between the beaks and the ventral border. It is much less flattened and less angular than *E. binumbonata*, Win., from Michigan.

Edmondia nuptialis, n. sp.—Shell of moderate size, transversely-suboval; in adult specimens considerably inflated in the vicinity of the pallial border. Beaks subcentral, small, incurved, somewhat elevated above the moderately extended, slightly arcuate hinge-line. Ventral margin gently curved or nearly straight in the middle; more rapidly curved toward the rounded, subequal extremities. Hinge structure obscure, but apparently consisting of one or more lateral teeth on each side of the beak. Surface unequally and interruptedly furrowed. Greatest thickness through the middle of the shell.

Length ·79 (100); height ·62 (78); thickness of both valves ·50 (63).

This species is relatively larger than *E. nitida*, and is destitute of the obtuse angulations descending along the anterior and posterior umbonal slopes of the latter. An associated, if not identical, species is less ventricose, with less central beaks, and can scarcely be distinguished from *Lucina? retusa*, Hall.

Edmondia strigillata, n. sp.—Shell rather small, rather gibbous, transversely oval; beaks subcentral, elevated, obtuse, somewhat strongly turned forward. Ventral margin gently arcuate in the middle, more rapidly curved toward the neatly-rounded extremities, of which the posterior is broadest. Hinge-line curved, furnished with a pair of rather thick lateral teeth; cardinal teeth, apparently none. Surface marked by fine radiating lines, and toward the margin by a few irregular concentric wrinkles.

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Length ·80 (100); height ·62 (77); thickness of both valves ·40 (50).

Resembles *E. nuptialis* in form, but it is less ventricose around the margin, and is further distinguished by its radiating striæ.

EDMONDIA ÆQUIMARGINALIS, Win., (=*Cardinia æquimarginalis*, Win., Proc. Acad. Nat. Sci. Phil., Sept, 1862, p. 413.) The identification with the Michigan species is quite conclusive, but the better state of preservation of this fossil necessitates a correction of the generic reference.

EDMONDIA (?) BICARINATA, n. sp.—Shell rather small, transverse, oblong, a little the widest at the posterior extremity of the straight, lengthened hinge-line; dorsal margin erect, not inflected; ventral margin subparallel with the dorsal, having a distinct shallow sinus near the middle, which leaves a diminishing furrow extending to the beaks; angularly rounded to the extremities, of which the posterior is truncate by a slightly curved line at right angles with the hinge-line, and another above this forming an angle of about 135° with the hinge-line. Beaks one-fifth the length of the shell from the anterior end, somewhat flattened, and incurved over a deep, distinct lunette. Greatest convexity one-third the distance from the dorsal to the ventral sides. A strong angular ridge extends from the beaks to the posterior ventral angle, and another, less conspicuous, to the angle connecting the two posterior truncated margins. Surface marked by fine incremental lines, parallel to the basal and posterior borders.

Length ·59 (100); height ·27 (41); thickness of both valves ·12 (20).

EDMONDIA (?) ELLIPTICA, n. sp.—Shell rather large, appressed, transverse, with an elongate-elliptical outline. Beaks flat, inconspicuous, situated one-fifth the shell-length from the anterior end. Hinge margin elongate, slightly curved, abruptly elevated; a flattened area extending from the beaks backward to the posterior hinge angle. Extremities nearly rounded. Surface marked by numerous distinct unequal lines running parallel with the pallial margin.

Length 1·36 (100); height ·65 (48).

SANGUINOLITES, McCoy.

SANGUINOLITES AMYGDALINUS, n. sp.—Shell of medium size, equivalve; length equal to two and a half times the height; beak about one-fourth the length from the anterior end, scarcely elevated above the hinge, somewhat depressed, incurved; dorsal margins slightly concave, posteriorly inflected inwards, forming a deep escutcheon; ventral margin gradually curved along the middle, more rapidly so toward the extremities; posterior extremity describing nearly a semicircle, and joining the dorsal line by a very easy angle; anterior extremity abruptly rounded to the deep, broad lunette, which reaches from the beak to the middle of the shell. Greatest protuberance one-third the distance from the beak to the venter, rather tumid; an obtuse angulation extending from the beak to the postero-basal angle; a strong internal ridge running near to, and parallel with, the hinge-line. Surface marked by strong concentric wrinkles, which nearly disappear in the dorsoumbonal region. A shallow sinus in front of the mid-ventral margin, which can be traced upward toward the beak.

Length ·97 (100); height ·44 (45); distance of beak from anterior end ·25 (26); from posterior ·72 (74); thickness of both valves ·36 (37).

Somewhat resembles *Allorisma Hannibalensis*, Shum., but differs in the absence of the "broad concentric ribs" of that species. It less resembles the Burlington fossil, usually referred to the same species.

SANGUINOLITES CYLINDRICUS, n. sp.—Shell small, equivalve; length equal to two and a half times its height; beak about one-seventh the length from the anterior end, elevated above the hinge-line, flattened and enrolled; greatest height along the perpendicular from beak to base; dorsal margin extended,

slightly concave upwards and inwards, sharply inflected inwards, forming a long, deep posterior escutcheon or cartilage base; ventral margin nearly straight, curving rapidly from a point opposite the beaks to the anterior extremity, which is abruptly rounded into the deep heart-shaped lunette; posterior extremity truncated by a line extending from the basal to the dorsal margin, and making with the latter an angle of 120°. Valves very ventricose, the greatest thickness being behind the central point on the sharp, prominent umbonal plication, which extends from the beak to the postero-basal angle—the area between this plication and the anterior region being curved subcylindrically from a dorsal to a ventral direction, and the area between the plication and the hinge-line being a triangular, twisted, somewhat concave surface, faintly marked by lines diverging from the beak to the posterior boundary. Entire surface covered with fine irregular striæ parallel with the basal and anal margins.

Length ·63 (100); height ·29 (46); thickness of both valves ·24 (38); height of posterior end ·20 (32); length of anterior end ·09 (14); of posterior end ·54 (86).

A peculiarity of this fossil is its cylindrical ventricosity and the posterior position of its greatest distension. (Compare Owen, Geol. Rep. Wis., Min., &c., Tab. III. A, fig. 18.)

Sanguinolites Iowensis, n. sp.—Shell of medium size, equivalve, transverse; height equal to nearly one-half the length; beaks elevated above the dorsum; subappressed, incurved and turned forward over a deep cordate lunette; dorsal line straight, reaching to near the posterior extremity of the shell; dorsal margin sharply inflected to form a long cartilage base; ventral border gently curved, posteriorly receding toward the dorsum, and forming at the extremity an angle of 80° with the short, truncate, nearly rectilinear hind margin; anterior extremity most projecting in the middle, from this point curving regularly to the ventral border and abruptly into the anterior lunette. Valves ventricose, most inflated in the middle; a sharp carina running sigmoidally from the beak to the postero-basal angle; another, still sharper, bounding the (posterior) escutcheon; the twisted triangular space between these being marked, on the cast, by three faint depressed lines, radiating also from the beak. External surface marked by irregular lines of growth, strongest on the anterior portion and faintest on the dorso-umbonal surface. In some specimens apparently not separable from this species, a shallow groove runs from the ventral margin nearly opposite the beak, over the umbo.

Length 1·03 (100); height ·52 (50); thickness of both valves ·38 (37); length of anterior end ·21 (20); of posterior end ·82 (80).

The forms last mentioned above attain a size fully once and a half as large.

The typical specimens of this species are quite distinct, but the larger ones approximate to *S. amygdalinus* in outline and characters of the dorsal region; but they differ in being larger, more ventricose, and in having a sharp umbonal angle and acute posterior extremity.

Sanguinolites sulciferus, n. sp.—Shell very small, transversely oblong, with nearly terminal beaks. Ventral margin broadly and rather deeply sinuate in the middle; anterior margin abruptly rounded below, terminating above in a deep lunette; posterior margin somewhat produced below, suddenly rounded at the basal angle, and very obliquely truncate from thence to the end of the second third of the dorsal side, from which point the straight hinge-line extends to the beak. Cardinal margins inflected to form a narrow, elongate escutcheon. Umbo full; umbonal ridge arcuate, with the convexity upwards, and terminating at the posterior basal angle; space above this somewhat concave, longitudinally marked by seven or eight strong imbricating concentric ridges.

Length ·26 (100); height ·14 (54); thickness of both valves ·09 (35).

Resembles in external form *Arca pinguis*, de Kon., (Anim. Foss., 116, ii. 11). Compare also *Cypricardia parvula*, (pl. ii. fig. 3).

The Hamilton group of New York furnishes a fossil similar to the above; and the Waverly sandstone of Ohio another similar, perhaps identical, one.

Sanguinolites (?) jejunus, n. sp.—Shell of moderate size, equivalve, transverse; beaks small, barely elevated above the hinge, slightly inflected, one-third the shell-length from the anterior end; height fully half the length; hinge-line extended; dorsal slope erect, marked by an internal ridge; margin slightly inflected, if at all, though some indication exists of a very narrow escutcheon; anterior lunette equally inconspicuous; ventral margin symmetrically arcuate between the extremities, with which it connects by similar gradually increasing curvatures; posterior end truncate for a short space near the termination of the hinge-line, with which it forms an angle of about 130°; anterior end semi-elliptically rounded. Valves somewhat appressed; greatest distension one-fourth the distance from the beak to the venter. Surface of cast marked by faint lines of growth.

Length ·86 (100); height ·48 (55); length of anterior end ·31 (36); of posterior ·55 (64); thickness of both valves ·20 (23).

Some specimens associated here are relatively shorter posteriorly, but not otherwise distinguishable.

McCoy's generic names and distinctions,—*Sanguinolites* and *Leptodomus*,—seem preferable to King's *Allorisma*, inasmuch as the latter name, besides being subsequent in time, was originally defined under an erroneous idea, and was finally left to embrace shells regarded as sinupallial,—a character which does not seem to belong to the so-called *Allorismas* of the Palæozoic period. *Sanguinolites Iowensis*, and probably some of the others just described, are allied in form to *Cypricardia;* but I agree with Pictet and others in believing that, while we have no evidence of the existence of the teeth of *Cypricardia* in any of the Palæozoic species generally referred to that genus, it is more natural to throw them into another association. Moreover, the sharply-inflected dorsal margin and broad, elongate posterior escutcheon, present in all the species of *Cœlonotidæ*, would seem to indicate real affinities, and thus withdraw the *Allorisma* type entirely from the association in which it has been placed. *Cypricardia? rigida*, White and Whitfield, from the same rocks, is a *Sanguinolites*.

CARDIOMORPHA, de Koninck.

Cardiomorpha trigonalis, n. sp.—Shell small or of moderate size, triangular, rather ventricose, with elevated, incurved beaks. Ventral margin slightly convex anteriorly, slightly sinuate near the posterior angle; anterior angle regularly rounded to the subtruncate anterior side; posterior angle rather acute, formed by the termination of the sharp postumbonal ridge, from which the surface descends precipitously to the truncate posterior margin. Hinge-line short, rounded, edentulous. Greatest thickness a little above the middle of the shell. Surface marked only by faint incremental striæ; younger specimens smooth.

Length ·82 (100); height ·72 (88); thickness of both valves ·50 (61).

This species has been sometimes regarded as *C. rhomboidea*, Hall, but none of the numerous specimens of it exhibit the least trace of radiating lines. The outline, moreover, is subtriangular instead of subrhomboidal. (Compare with *C? triangulata*, Swallow, St. Louis Trans., i. 655.)

ARCA, Linnæus.

Arca modesta, n. sp.—Shell small, very ventricose, quadrate-oval, with a posterior alate prolongation of the hinge-line. Beaks subterminal, incurved, separated by a ligamental area; posterior hinge-line straight, nearly as long as the shell. Umbonal ridge and body of the shell inflated to the ventral mar-

gin; alate expansion gradually flattened; anterior end abruptly rounded, excavated by a lunuliform area in front of the beaks; posterior end rounded below, truncate above. Surface covered by fine, rather regular, sharp, concentric striæ; the alate expansion bears also faint traces of two or three furrows diverging from behind the beak.

Length ·31 (100); height ·22 (71); thickness of right valve ·10 (32); angle between hinge-line and umbonal ridge 35°.

This little species closely resembles *A. arguta*, Phill., sp., var. de Kon., (Anim. Foss., pl. iii. fig. 12.) The beaks, however, are still more terminal than in that variety, and the lunette is not so sharply bounded. *Arca arguta*, var., is from carboniferous limestone—Visé. Though the dental characters of the present species have not been observed, it can scarcely prove to be anything but an *Arca* or *Macrodon*.

MACRODON, Lycett.

Macrodon cochlearis, n. sp.—Shell of moderate size, rather ventricose, length equal to twice the height; beaks subterminal, flattened, incurved. Ventral border straight, or slightly sinuate in the middle, symmetrically curved toward the extremities; posterior extremity truncate from the hinge-line one-third its width; anterior extremity most projecting above the middle, excavated above by a small deep lunette; dorsal line straight, nearly as long as the shell, not inflected; posterior cardinal extension with feeble indications of one or more lateral teeth. Surface finely striated concentrically.

Length ·88 (100); height ·44 (50); length of anterior end ·16 (19); of posterior end ·72 (81); thickness of left valve ·18 (22).

Resembles *M. parvus*, White and Whitefield, but, besides its larger size, it is much less ventricose, especially in the posterior half, and has not the conspicuous muscular pits of that species.

NUCULA, Lamarck.

Nucula microdonta, n. sp.—Shell small, transversely oblong; height equal to two-thirds the length; beaks small, somewhat incurved, but little elevated above the hinge-line, about one-third the length from the short end. Ventral border rapidly curved, and regularly so to the vicinity of the long end, where it is slightly sinuated, from which point a shallow groove extends up nearly to the beak. Dental plates but little angulated between the beaks; the larger bearing near its outer margin 10 or 12 minute transversely tubercular teeth, and the shorter 4 or 5. Teeth not distinguishable to the beaks, but no cartilage pit seems to be present. Anterior muscular pit oblong, surmounted by a large pedal scar. Shell most ventricose in the middle. No surface markings discernible.

Length ·47 (100); height ·32 (68); length of short end ·18 (38); of long end ·29 (62); thickness of both valves ·18 (38).

This little species is readily distinguished from *N. Iowensis*, and most others of this age, by its very small teeth and the absence of the usual nuculoid outline.

Ranges from bed No. 5 into the base of the Burlington limestone.

LEDA, Schumacher.

Leda saccata, n. sp.—Shell very small, transversely elongate, rostrate at the longer extremity; obtuse, ventricose and saccate at the other. Beak abruptly, though moderately drawn out, and but slightly incurved. Ventral side strongly curved, becoming nearly straight toward the rostral extremity. Dorsal region deeply excavated for an escutcheon on the longer side of the beak; hinge plates bearing each six or seven teeth. Greatest thickness of shell between the beaks and the middle. Pit of adductor of short end very deep

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on its superior border; the other pit smaller, deepest on its superior border Surface with fine, indistinct striæ of growth.

Length ·32 (100); height ·16 (50); length of short end ·13 (41); of long end ·19 (59); thickness of both valves ·13 (41).

ISOCARDIA Lamarck.

Isocardia? Jennæ, n. sp.—Shell of rather large size, triangular, very ventricose. Beak elevated above the hinge, flattened, incurved and directed forward, with a deep lunule in front. Hinge-line extended posteriorly; alate expansion more or less flattened, posterior border truncated at right angles with the dorsal line, elongate; antero-ventral margin nearly straight throughout the lower two-thirds of its length, forming an angle of 50° with the posterior border, above gradually curved to the lunette. An elevated sharp umbonal ridge runs sigmoidally from the beak, arching first backwards, then forwards, and again backwards to the posterior ventral angle; the posterior slope from this ridge becomes more and more steep in approaching the beak, at and near which it faces dorsally, and is overhung by the umbonal ridge. A shallow sinus appears in the middle of the antero-ventral margin, from which a furrow ascends toward the beak. Surface marked with faint incremental lines which, on the antero-ventral slope near the base, become distinct, and nearer the beak rise in well marked wrinkles converging in the lunette. Greatest length from beak along the umbonal angle 1·27; length of hinge-line ·81; length of shell posterior to the beak ·65; length of posterior side ·90.

This species, in its essential features well marked, seems, nevertheless, to be quite variable. In some specimens the posterior alate portion is much more developed. In others it is less developed, and the umbonal ridge is more acute, giving the shell the appearance of being truncated through its thickest part.

There is no direct evidence of the affinities of this species with *Isocardia*, except the swollen umbones and enrolled beaks; and it is so referred, mainly, in deference to high authorities who have made similar disposition of such forms. (See Sandberger, Verstein., pl. xxvii. fig. 11). It has the posterior wing of the *Aviculidæ*, and also the ventricose left valve and enrolled beak of *Aucella* in that family. Yet it differs from *Aucella* in having the right valve equally ventricose, and in being entirely destitute of an anterior wing and byssal sinus. The sharp, sigmoid umbonal angle is a feature seen in some species usually referred to *Cypricardia* (See *C. bipartita* de Kon. Anim. Foss., p. 94. pl. fig. 15).

Finally, it is worthy of mention that the peculiar angular form of this species is but an exaggeration of the characters of *Sanguinolites cylindricus*. It is relatively shorter, more ventricose and more flattened on the posterior cardinal angle. If external form is to be the basis of family distinctions and alliances, (See Agassiz, Cont. to Nat. Hist. of N. A.) then *Isocardia Jennæ* will go with *Sanguinolites cylindricus*, Win., *S. decipiens*, McCoy, *Cypricardia rigida*, W. and W., *C. bipartita*, de Kon., *Isocardia cœlata*, Sandb., &c., &c., into a family whose circumscription has not yet been marked out.

CARDIOPSIS, Meek and Worthen.

Cardiopsis megambonata, Win. (Proc. Acad. Nat. Sci., Sept., 1862, p. 417.)—The specimen here referred is many times larger than the types of the species, being of the size of *C. crenistriata*, Win., from which it differs principally in the coarser and more rigid ribs and more prominent beak.

The ribs in the Burlington specimens do not increase in number with age, and scarcely increase in size; the intercostal spaces are flat, gradually widening.

Height from beak to ventral margin ·91 (100); length ·85 (97); thickness of left valve ·55 (60).

SANGUINOLARIA, Lamarck.

SANGUINOLARIA? LEPTOGASTER, n. sp.—Shell small, thin, subquadrangular. Beaks subcentral, flat, not elevated above the dorsal line. Posterior end obliquely truncated; anterior gently rounded below, abruptly above, with a long deep lunette; ventral side arcuate in the middle, joining the extremities by a gradually increased curvature. Umbo flattened,—a low ridge extending obliquely to the posterior basal angle. Dorsal line straight behind the beaks, joining the posterior side at an angle of 125°. Surface marked by fine regular striæ parallel with the ventral and posterior margins.

Length ·53 (100); height ·38 (71); thickness of valves ·09 (17).

BELLEROPHON, Montfort.

BELLEROPHON CYRTOLITES, Hall, (Thirteenth Rep. Reg. N. Y., p. 107).—A small Bellerophon, laterally appressed, and with an acute periphery, approaches too closely to *B. cyrtolites* to justify discrimination. It is known, however, only by its cast, which is quite smooth. Should the identification prove correct, this species occurs at Rockford, Ind., Marshall, Michigan, and Burlington, Iowa.

PORCELLIA, Lévéille.

PORCELLIA RECTINODA, n. sp.—Shell small, gradually enlarging, marked by a series of transverse nodes, which are strongest on the dorso-lateral region, and gradually diminish to the middle of the side; transverse section between two nodes subcircular. Dorsum unknown.

Diameter of last whorl about ·59; dorso-ventral diameter of tube near the aperture ·19.

This species differs from *P. crassinoda*, White and Whitefield, in its circular section and transversely elongate nodes—from *P. obliquinoda*, White, in the transverse position of the nodes—and from *P. nodosa*, Hall, (Geol. Surv. Ia., Supplem. to vol. i. part 2, p. 92), in its much smaller size and different geological horizon,—the latter being found in the upper bed of the Burlington limestone, which has thus far furnished no species identifiable with fossils from the sandstones below.

DENTALIUM, Linnæus.

DENTALIUM GRANDÆVUM, n. sp.—Shell rather large, perfectly straight and terete, or a little compressed; tapering ·09 in one inch near the larger end, less rapidly near the small end; surface marked by faint, irregular incremental striæ, which run obliquely around the shell, and in flattened specimens are most advanced along one edge.

Length of largest specimen 2·18; diameter at larger end ·21; at smaller end about ·05.

This species resembles *D. venustum*, Meek and Worthen, (Proc. Acad. Nat. Sci., Phila., June, 1861, p. 145), from the St. Louis and Spergen Hill limestones. The latter, however, tapers but ·075 in one inch, and is described as "nearly" straight and quite smooth, while the present species is rigidly straight and transversely striated.

PLATYCERAS, Conrad.

PLATYCERAS CORNUFORME, n. sp.—Shell small, describing about half a whorl, very rapidly enlarging, similarly curved throughout, broadly and obtusely carinated, when young, along the peripheral line; transverse section becoming subsequently nearly circular; aperture a little oblique to the whorl, with a somewhat sinuous peristome,—the principal sinus being just beneath the middle of the outer lip. Surface marked only by striæ of growth, which curve forwards on the sides, and backwards along a belt just beneath the periphery. The shell is nearly symmetrical and its curvature planorboid. The apex is blunt and not perceptibly turned to the right or left.

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Height when resting on the aperture ·32; summit in this position two-thirds the distance from the aperture to the apex; width of aperture ·33.

PLATYCERAS VOMERIUM, n. sp.—Shell of medium size, describing about half a direct whorl, very rapidly enlarging; peripheral (or dorsal) region elevated and surmounted by a strong, broad, rounded carina, which becomes more obtuse toward the aperture,—a shallow groove running along each side of the carina; transverse section showing an angle of about 70° toward the beak, which enlarges to about 110° near the aperture; surface of cast destitute of markings.

Distance from front of aperture in a straight line, to most projecting portion of beak ·85 (100); height of shell when resting on the aperture ·47 (55); summit when in this position three-fifths the distance from aperture to apex; length of aperture ·67 (79); width of aperture ·58 (68).

This sharp-backed species approaches *P. carinatum*, Hall, (Fourteenth Rep. N. Y. Reg., p. 5,) but differs in being equilaterally developed. It belongs to the *Orthonychia* group, which Prof. Hall has welded to the Neritoid forms under one generic designation.

Believed to range from the base of the yellow sandstones into the base of the Burlington limestone.

PLEUROTOMARIA, Defrance.

PLEUROTOMARIA? ROTA, n. sp.—Shell small; spire depressed, convex, consisting of four or five flattened whorls; suture sharply channelled as if by the rabbet of a joiner. Base of shell unknown, but a solid axis in the cast of the spire would indicate a deeply perforate umbilicus. No surface markings.

While the imperfect specimens plainly indicate an undescribed species, it is as yet impossible to determine the generic position of the shell.

Ranges from bed No. 5 into the base of the Burlington limestone.

PLEUROTOMARIA TECTORIA, n. sp.—Shell small; spire trochoid, consisting of about four whorls, flattened between the periphery and the suture; periphery marked by a raised, somewhat bicarinate band; a raised carina running along the upper margin of each whorl close to the suture; base rounded regularly from the periphery to a small, sunken, perforate umbilicus; aperture subcircular, somewhat modified by the body whorl, angulated posteriorly, rounded in front,—the peristome descending into the umbilicus.

MURCHISONIA, d'Archiac.

MURCHISONIA QUADRICINCTA, n. sp.—Shell of medium size, turrited; whorls convex, regularly enlarging to the last, with an obsoletely bicarinate band running along the middle, below which are four small, rigid, thread-like, approximated carinæ, leaving the base of the body whorl smooth or faintly lined, and regularly curved into the umbilical cavity; the surface above the band marked only by very delicate lines of growth, which arch backwards to the peripheral band, below which they arch far forwards, entering the umbilical cavity half their length in advance of their place of origin at the suture. Suture deeply impressed.

The only specimen showing the external markings has a defective spire, but it could not be completed with less than 8 or 9 whorls, giving a length of 1·8 (100); an apical angle of 19°, a sutural angle of 66°, while the body whorl is ·25 (14) high.

Some internal casts—perhaps of the same species—have double the above dimensions, and exhibit a shallow longitudinal groove on the penultimate whorl near the suture, which, in the ultimate whorl, becomes a broadly concave flattening of the upper region, and a somewhat sharp angulation at the suture. In these, the outer lip is rounded, the inner somewhat excavated, and the aperture is angulated and slightly effuse in front. Still other casts exhibit a more elevated spire, with the smooth, rounded whorls barely in con-

tact, the body whorl disproportionately enlarged, the aperture effuse and the general aspect that of *Loxonema;* but the condition of the specimens renders it unsafe to undertake to decide on specific or even generic characters.

The general appearance of this species is like that of *M. bilineata*, Goldf. (Petr. Germ. iii. 24, Taf. cixxii. 1,) but the four carinæ below the band render it easily distinguishable. The casts recall *Turritella obsoleta*, Sow. from the old red sandstone of Felindre.

Murchisonia neglecta, n. sp.—Shell of moderate size, turreted, with an apical angle of 12°. Suture impressed, whorls convex, slightly flattened above the middle, bearing a bilinear band below the middle close to the suture. Surface marked by faint, transverse, sinuous striæ, which, on the outer portion of the body whorl, appear to assume the character of transverse wrinkles.

Described from a defective specimen, but the bicristate band on the lower side of the whorls is sufficient evidence of its distinctness. It seems to have consisted of 8 to 10 whorls.

Murchisonia Shumardiana, n. sp.—Shell small, conical, consisting of six or seven gradually enlarging whorls, somewhat flattened on the base and outer surface, so as to leave but a shallow suture; body whorl obtusely angulated at the junction of the basal and lateral surfaces; aperture broadly cuneate-ovate, angulated behind, scarcely effuse in front; plane of aperture parallel with vertical axis of shell. Surface of cast quite smooth.

Height of shell ·57 (100); height of last whorl ·24 (42); diameter of base of shell ·28 (49); length of aperture ·23 (40); greatest width ·17 (30); apical angle 34°.

Much resembles the young of *M. prolixa*, W. and W. It differs in more rapidly enlarging whorls, larger apicial angle and the obtuse angulation limiting the basal surface.

STRAPAROLLUS, Montfort.

Straparollus Barrisi, n. sp.—Shell of medium size, depressed-turbinate; whorls four or five in number, moderately impressed, rather gradually enlarging to the last, which enlarges somewhat rapidly; surface generally convex, with three rounded, barely perceptible angulations.—the first near the somewhat channelled suture, the second along the periphery, and the third at the brink of the medium-sized umbilical cavity. Base of the body whorl sometimes slightly flattened, giving an increased transverse diameter to the section, —a feature which is associated with a somewhat greater depression of the spire.

Diameter of one of the largest specimens ·96 (100); height ·67 (69); height of body whorl ·46 (48); transverse diameter of body whorl near aperture ·38 (40); approximate diameter of umbilicus ·29 (30); spiral angle 100°.

This somewhat resembles a species in the Burlington limestone, but the spire is somewhat more elevated, the suture deeper and the whorls are less rapidly enlarged.

Straparollus macromphalus, n. sp.—Shell of moderate size; spire little elevated; whorls barely in contact, gradualllly enlarging, with a nearly circular section, and circumscribing a broad dish-like umbilical cavity, open to the apex of the spire. Surface of the whorls marked by distinct regular striæ of growth, which arch slightly backward in descending the umbilical cavity, and terminate with a slight forward curvature.

Diameter of shell ·84 (100); transverse diameter of body whorl near aperture ·25 (30).

A close analogue of some forms of *Euomphalus lævis*, d'Arch. and Vern., and can only be distinguished by its wider umbilicus and slightly sigmoid striæ on the base of the body whorl. *Straparollus costellatus*, McCoy, (Pal. Foss., 538, pl. 3 H. fig. 3,) is a closely-related form, but differs in some of its surface markings and its larger number of whorls.

PHANEROTINUS, J. Sowerby.

PHANEROTINUS PARADOXUS, n. sp.—Shell of medium size, discoid; whorls four, widely disjoined, rather rapidly enlarging, nearly terete; spire depressed below the level of the outer whorl, causing a slightly deeper concavity above than below the shell; upper side of last whorl with a scarcely perceptible undulation in the middle, and another on the slope of the umbilical depression; under side regularly curved; faint incremental lines running directly around the whorl.

Diameter of shell 1·0 (100); diameter of aperture at right angles with peripheral line ·33 (33); same dimension one revolution back from the aperture ·14 (14).

The faint appearance of angulations on the upper side may be deceptive; in which case, the greater depression of the spire on that side would indicate it as the base of the shell, and the whorls would be sinistral.

The only specimen of this unique species—so far as I know, the first of the genus noticed in America—is in the form of a gutta-percha cast, taken from natural moulds in friable sandstone, of the spiral and basal sides of the same individual. The moulds themselves it was impossible to preserve. The nearest American analogue of this species is *Euomphalus laxus*, Hall, (Fifteenth Rep. Reg. N. Y., p. 54, pl. vi., fig. 2).

HOLOPEA, Hall.

HOLOPEA CONICA, n. sp.—Shell very small; spire elevated, consisting of about three or four rounded whorls, of which the last forms about four-fifths of the entire length; suture distinct; aperture lying nearly in the plane of the axis of the spire, ovate, acutely angulated behind, neatly rounded in front; outer lip thin, regularly convex; inner lip almost equally convex, slightly thickened by the nearly continuous peristome. Surface not satisfactorily known, but apparently smooth.

Length ·27 (100); length of body whorl ·20 (74); width of body whorl ·18 (67); length of aperture ·12 (44); width of aperture ·08 (29); spiral angle 44°.

This little species generally resembles *Holopella mira*, but the apical angle is greater, the body whorl more developed and the aperture more angulated behind, with a less continuous peristome.

HOLOPEA SUBCONICA, n. sp.—Shell small, breadth equal to its height; spire turbinate, consisting of two or three rounded, rapidly enlarging volutions, bounded by a distinct suture; aperture subcircular, with a slightly interrupted peristome; outer lip thin; base gracefully rounded into the minutely-perforated umbilicus, which is closely bordered by the free columellar lip. Surface apparently smooth.

Height about ·15 (100); width of last whorl ·16 (94); height of last whorl ·09 (56); apical angle about 80°.

Associated with *Holopea conica* and *Holopella mira* in the calcareous bed "No. 3."

MACROCHILUS, Phillips.

MACROCHILUS PINGUIS, n. sp.—Shell globoid; spire short, rapidly tapering; volutions not more than five, largely overlapping; suture moderately impressed; body whorl ventricose, broadest in the middle, somewhat flattened above; aperture ovate, its longer axis forming an angle of 27° with the axis of the shell, acute posteriorly, abruptly rounded anteriorly; inner lip flattened, with indications of a columellar fold. Surface marked by faint directly transverse striæ of growth.

Height of shell 1·93 (100); height of body whorl 1·41 (73); height of spire ·52 (27); length of aperture 1·44 (74); width of aperture ·93 (48); spiral angle 85°.

This species is related to some of the globose forms from the Coal Measures.

Its closest analogue is *M. primigenius*, Hall, (Io. Rep. p. 720, pl. xxix. 11.) = *M. ponderosus*, Swallow, (Trans. Acad. Sci., St. Louis, i. p. 202). The aperture, however, is broader, the spire less elevated and the columellar fold apparently much less pronounced.

From the lower bed of the yellow sandstones—being, until the recent description of some specimens from the Hamilton Group of New York, (See Fifteenth Rep. N. Y. Reg., p. 48), the lowest known position of this section of the genus.

LOXONEMA, Phillips.

Loxonema oligospira, n. sp.—Shell small; whorls about six, rather rapidly enlarging, convex exteriorly, with traces (on the cast) of vertical ridges, which become most observable in the vicinity of the aperture; suture deep; body whorl three-fifths the length of the shell, more rapidly enlarging than the spire, gently convex on the outer side, more rapidly curved toward the base —which is somewhat umbilicately indented—rapidly increasing in diameter toward the aperture, which is thus rendered somewhat effuse in front.

Height of shell ·41 (100); height of body whorl ·25 (61); diameter of body whorl ·29 (71); diameter of penultimate whorl ·16 (39).

HOLOPELLA, McCoy.

Holopella mira, n. sp.—Shell small, turrited; whorls gradually and regularly enlarging, seven or eight in number, of which four or five are generally preserved,—the apical ones, in numerous specimens, uniformly wanting; whorls sometimes slightly flattened on the exterior; suture distinctly but not deeply impressed; body whorl regularly rounded beneath into a minute umbilicus; aperture nearly circular, obtusely angulated behind, regularly rounded in front; peristome complete or slightly interrupted; columellar lip without a fold, very slightly excavated by the aperture.

Height of shell about ·24 (100); height of body whorl ·11 (46); diameter of body whorl ·14 (58); apical angle 35°.

This little shell occurs gregariously in calcareous layers of bed No. 3, and also occasionally in sandstone No. 5. The exterior seems to be destitute of natural ornaments, but the specimens in bed No. 3 are universally marked by lines like cleavage cracks, running very obliquely across the several whorls,—their lower extremities being nearest the aperture.

This fossil bears a close resemblance to *Turritella* (*Holopella*) *gregaria* and *conica*, Sow., (Murch. Sil. Syst., pl. iii. fig. 1, f. and 8) from the old Red Sandstone, but it differs from both (See McCoy, Pal. Foss., p. 303,) in apparently having no natural surface markings.

NATICOPSIS, McCoy.

Naticopsis depressus, n. sp.—Shell small; spire of about four volutions, scarcely elevated above the body whorl; last whorl rapidly enlarging, especially in an obliquely transverse direction; suture very shallow, giving the upper side of the shell a general convexity; width of last whorl at the aperture three-fifths the transverse diameter of the shell; aperture oval, rounded anteriorly and posteriorly; within, somewhat contracted on the inner side by the broad, flattened columella; surface marked by delicate lines of growth, which, toward the suture, become, on the last whorl, fine, regular, elongated nodes. Highest point of shell, when resting on its base, is on the last whorl, near the junction of the outer lip with the penultimate whorl.

Height of shell from antero-lateral margin of aperture obliquely to summit of spire ·50 (100); greatest transverse diameter ·59 (118); width of body whorl measured in the same direction ·36 (72); altitude of shell when resting on its base, in a direction nearly at right angles with the last measure ·30 (60); length of aperture ·37 (74); width ·32 (64).

ORTHOCERAS, Breynius.

Orthoceras Whitei, n. sp.—Shell annulated, very gradually tapering, with

very deep concave septa, and a somewhat elliptic section. Major angle of divergence 5° in a specimen about four inches long, giving a taper of ·09 in the space of one inch; ratio of axes of transverse section ·98 : 1·32 = 1·34; ratio of concavity of septa to greater diameter ·38 : 1·2 = 3·16; annulations, ten in the space of three inches, where the mean transverse axis is 1·27, making their distance a little less than one-fourth this axis, the plane of the annulations forming an angle of 74° with the longitudinal axis of the shell, the opening generally toward the extremity of the shorter diameter; the annulations having a broad, shallow, retral sinuosity, which in some specimens is distinctly marked, and in others obscure; position of the sinuosity somewhat variable; space between the annulations regularly concave; a peculiar obsolescence of the annuli sometimes occurs along the side marked by the sinuosity, and not unfrequently a partial or nearly complete obsolescence of entire annuli takes place along a portion of the shell. Siphon large, situated on the longer diameter two-sevenths of the distance from the centre to the periphery. Surface (of cast) marked by feeble, rounded, encircling striæ, which generally run parallel with the annulations, but sometimes cross them at a small angle.

The deep concavity of the septa is a strong distinctive mark of this, amongst annulated species. In many specimens this is much deeper than in the large specimen from which the measurements have been taken. The occasional obsolescence of the annulations may also be noted.

Orthoceras heterocinctum, n. sp.—Shell unequally annulated, rather rapidly tapering, with a nearly circular section and a subcentral siphon. Angle of divergence 11°; annulations inequidistant, strong, rounded, separated by concave intervals, somewhat oblique and slightly sinuated retrally on one of the sides, very often becoming more or less obsolete, and sometimes entirely disappearing; septa slightly oblique; siphon on the longer diameter less than its own diameter distant from the longitudinal axis of the shell. Surface marked by unequal striæ running parallel with the rings.

Resembles *O. Whitei* in the occasional obsolescence of the rings; and casual observation would not distinguish the two. The present species, however, tapers more rapidly, is less compressed, has a less excentric siphon and exhibits a much more frequent disappearance of the annuli.

Ranges from the base of the yellow sandstones into the base of the Burlington limestone.

Orthoceras Indianense, Hall, (Twelfth Rep. N. Y. Reg., p. 10.)—Numerous specimens of an *Orthoceras* having a circular or slightly eccentric section, a central or subcentral siphon and an angle of divergence of about 8° fail to furnish any characters for distinction from the above species. If such identification is correct, this species enjoyed considerable geographical range.

Ranges from the bottom of the yellow sandstones into the base of the Burlington limestone, in company with crinoids regarded as characteristic of the latter formation.

PHRAGMOCERAS, Broderip.

Phragmoceras expansum, n. sp.—Shell slightly arcuate in the earlier stages of growth, becoming nearly straight at a later period; somewhat gradually enlarging at first, but afterwards expanding with great rapidity, finally undergoing a gradually reduced rate of expansion, which, at the aperture of the adult, amounts to a slight constriction; transverse section very slightly compressed laterally; position of siphon unknown; septa transverse, moderately concave. Surface of cast smooth.

In a specimen which is ·70 in diameter at the small (imperfect) end, the same diameter increases to 2·1 in the space of 1·37 inches, showing an angle, of divergence of about 68°.

CYRTOCERAS, Goldfuss.

Cyrtoceras unicorne, n. sp.—Shell arcuate; angle of divergence when young

about 11°, rapidly increasing with the growth of the shell to 35° or 40°; transverse section laterally compressed, with the dorsum a little more acute than the venter; last chamber fully half the length of the shell. Septa transverse, regularly concave. Siphon rather large, terete, somewhat close to the dorsal margin. Surface apparently without ornaments; incremental lines forming a variable angle with the septa.

A specimen which is 2·23 long is ·38 in dorso-ventral diameter at the small (imperfect) end, and 1·60 at the larger end, being septate the whole length. Another specimen must have been about 2·3 in dorso-ventral diameter at the larger end.

PHILLIPSIA, Portlock.

Phillipsia insignis, n. sp.—Head paraboloid; border wide, broadly and deeply furrowed, with the margin reflected upward, and the lateral angles continued posteriorly in acuminate prolongations, reaching twice the length of the glabella from the anterior end; the margin and reflected portion of the test marked by fine longitudinal striæ. Glabella elongate-paraboloid, tuberculated. In the middle of the posterior border of the glabella is a pair of tubercles, and in front of these a second and third pair, the last resting on the middle of the glabella—the whole so arranged as to form two longitudinal rows; opposite the first pair are the two small complementary lobes, with four pustules on the summit of each; opposite the second pair, on each side, a transversely elongate tubercle with a trifid crest; opposite the first pair, a similar tubercle with a bifid crest; the ornaments on the posterior half of the glabella being consequently arranged in three transverse series, in the posterior of which are ten elevations, in the middle eight, and in the anterior six; the anterior half of the glabella is covered by pustules somewhat promiscuously arranged, and varying in different specimens. Eyes large, globoid, slightly excavated by the palpebral lobe of the fixed cheek, situated opposite the posterior third of the glabella. Occipital ring broad, with its posterior margin elevated nearly as high as the posterior extremity of the glabella, and ornamented with a row of small, raised points turned backwards. Pygidium very convex, semielliptic, the axis very prominent and forming about one-third the width at the anterior margin; consisting of twelve to fourteen rings, each bearing six small tubercles, the whole of which are arranged in six longitudinal rows; the tubercles often worn down on the exterior of the test, but always well defined in the cast; lateral lobes bent rather abruptly downwards, having ten ribs, which become indistinct and disappear toward the margin, and are entirely wanting over the narrow space behind the axis; the anterior ribs showing a faint median groove toward their vanishing extremities, and a a few of the posterior ones bearing feeble tuberculations toward their axial extremities.

The pygidium of this species nearly resembles that of *P. truncatulus*, Phillips, sp. (Geol. Yorks, ii. p. 240, pl. xxii. fig. 13,) but the head is widely different.

From the base of the Burlington limestone.

Phillipsia Maramecensis? Shumard.—Border of head of medium width, regularly convex, separated from the glabella by a narrow, distinct furrow. Glabella oblong, slightly quadrangular, a little broader behind than before, convex, highest in the middle; complementary lobes obliquely oval, protruding a little beyond the lateral boundaries of the glabella, from which they are separated by shallow depressions; a diminishing series of three feeble lobes in front of each complementary lobe; surface of glabella smooth to the naked eye, but under a lens finely granulated. Eyes opposite the last quarter of the glabella.

The fragment above described is associated with the pygidium described by Dr. Shumard, (Mo. Rep. Part ii. p. 199, Pl. B. fig. 9,) simply in consequence

[Jan.

of the granulated surface of the two, and the impossibility of proving them distinct. The original specimen, however, was obtained from the "Archimedes limestone" of St. Louis County, which, according to Prof. Hall, is the equivalent of the "Keokuk limestone."

Of the foregoing species, four are not positively known to occur below the base of the Burlington limestone; but they are confidently embraced in the fauna of the yellow sandstones, for the reason that they ascend no higher, and that of the 131 remaining species constituting that fauna, not less than 40 are known to range upwards to the same horizon.

University of Michigan, Dec. 6th, 1862.

Pursuant to the By-Laws, an election of members of the Standing Committees for 1863 was held, as follows:

ETHNOLOGY.
J. A. MEIGS,
S S. HALDEMAN,
I. I. HAYES.

BOTANY.
E. DURAND,
JOSEPH CARSON,
AUBREY H. SMITH.

COMP. ANAT. AND GEN. ZOOLOGY.
JOSEPH LEIDY,
J. M. CORSE,
J. H. SLACK.

GEOLOGY.
ISAAC LEA,
CHARLES E. SMITH,
J. P. LESLEY.

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

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

ORNITHOLOGY.
JOHN CASSIN,
S. W. WOODHOUSE,
J. H. SLACK.

PALÆONTOLOGY.
JOSEPH LEIDY,
T. A. CONRAD,
J. L. LE CONTE.

HERPETOLOGY & ICHTHYOLOGY.
E. D. COPE,
R. BRIDGES,
J. C. MORRIS.

PHYSICS.
B. HOWARD RAND,
WM. M. UHLER,
R. E. ROGERS.

CONCHOLOGY.
T. A. CONRAD,
W. G. BINNEY,
G. W. TRYON, JR.

LIBRARY.
WM. S. VAUX,
JOSEPH LEIDY,
JOSEPH JEANES.

ENTOMOLOGY AND CRUSTACEA.
R. BRIDGES,
SAMUEL LEWIS,
E. T. CRESSON.

PROCEEDINGS.
ROBERT BRIDGES,
JOSEPH LEIDY,
WM. S. VAUX,
JOHN CASSIN,
THOMAS STEWARDSON.

February 3d.

The President, Mr. LEA, in the Chair.

Nineteen members present.

The following were presented for publication:

Systematic arrangement of the Mollusks of the Family Viviparidæ and others inhabiting the United States. By Theodore Gill.

Enumeration of the Arctic Plants collected by Dr. I. I. Hayes, in his Exploration of Smith's Sound, etc. By E. Durand, T. P. James and S. Ashmead.

Mr. Cope mentioned the occurrence in the males of certain species of tree-toads of the genus Trachycephalus, of a corneous thickening of the epidermis of the interior metatarsus during the breeding season, similar to that in the genus Discoglossus. Also, that in certain South American Bufones the manubrium sterni is present, although, up to the present time, it has been denied that such is the case.

February 10th.

The President, Mr. LEA, in the Chair.

Twenty-nine members present.

The following was presented for publication:

Remarks on the North American Ægiothi. By Elliott Coues.

Mr. Lea read part of a letter from Dr. Lewis, of Mohawk, New York, in which he said that he was gratified with one thing which was not apparent to him at first. In his notes on *Melania subularis*, Lea, and *M. exilis*, Hald., two species of his neighborhood, he finds an evident confirmation of Mr. Lea's views about *Trypanostoma* and *Goniobasis*, to which two sections of *Melanidæ* the two species belong. The soft parts affirm the correctness of Mr. Lea's generalizations from the shells. Dr. Lewis thinks the *sinus* in the sides of *subularis* is peculiar, and will be found in the whole group of *Trypanostoma* and the *granular sides* of *exilis* in the whole group of *Goniobasis*. It becomes now a curious speculation what may be the characters of *Anculosa*, *Schizostoma*, *Lithasia*, *Io*, &c.

Dr. Wilcocks read an extract from M. Arago's "Astronomie Populaire," vol. i. p. 459: "I have been anxious to ascertain who first noticed the existence of blue stars. The ancients only spoke of white and red ones. In the latter class they placed Arcturus, Aldeboran, Pollux, Antares and Orionis, which are still red. To this list (and the circumstance is worthy of remark) they added Sirius, whose whiteness strikes all eyes. It seems, then, that with time certain stars change color. The first observation (known to me) made of a blue star, occurs in the Treatise on Colors, by Mariotte, published in 1686."

Dr. Wilcocks stated that he had read the extract from M. Arago's work as a preface to an observation of his own,—viz.: that the star Sirius is no longer white; its present color is violet.

If the star, instead of undergoing a single change of color in the lapse of ages, should take in succession all the hues of the spectrum, it adds much to the interest of the subject, and will certainly give an impetus to inquiry concerning the cause of these remarkable changes.

Mr. Ennis remarked that this announcement by Dr. Wilcocks appeared to him deeply interesting, from the fact that for the past year he had made the colored, the variable, the periodic, the lost, and the temporary stars a special

study. Catalogues have been made of some of these classes of stars, but no catalogue has yet been made of stars which have changed their color. Indeed, Humboldt, in writing about the red color ascribed to Sirius by the ancient Greeks, says, "Sirius, therefore, affords the only example of an historically proved change of color, for it has at present (1850 ?) a perfectly white light." And yet, in apparent contradiction to this, he, in other pages of the third volume of his Cosmos, mentions other fixed stars whose colors in modern times have been known to change.

This change of color is one of the greatest physical events. Think of our own intensely-lighted sun, 2,770,000 miles in circumference, as being deeply red, then turning to be perfectly white, then changing to purple, and then again to green! What mighty causes must be in operation to produce such grand results. This should be made a distinct section of astronomical study, and allied to that of the other classes of stars just mentioned; and I therefore offer the following as an enumeration of stars whose colors have changed.

CATALOGUE.

1. The temporary star described by Tycho Brahe in 1572. "For the first two or more months it was white; then it passed through yellow into red. At last, when very small, it again became white, but of a dull whiteness. These changes of color were attendant upon changes in amount of light. While this star was so large as to be seen with keen eyes by day, and even through the clouds by night, when all other stars were hidden, yet it scintillated more strongly than stars of the first magnitude," thus indicating a constitutional as well as an atmospheric cause for this scintillation.

2. Eta of Argus. This star, so wonderfully variable in the amount of its light, is also variable in its color. In 1843, Mr. Mackay, at Calcutta, observed that it was similar in color to Arcturus, and was therefore reddish-yellow. In Feb., 1850, Lieut. Gilliss, at Santiago, in Chili, writes of it as being "of a darker color than Mars," and therefore deeply red.

3. Beta of Ursa Minor. Heis, one of the most eminent German observers, writing to Humboldt in May, 1850, says that "this star is not always equally red; at times it is more or less yellow, at others most decidedly red."

4. Alpha Crucis. Humboldt, in Cosmos, vol. 3d, says, "My old friend, Captain Berard, who is an admirable observer, wrote from Madagascar in 1847, that he had for some years seen this star growing red."

5. Capella. In the tenth century this star was described by an Arabian astronomer as red. In 1850, Humboldt, in the third volume of his Cosmos, says, "it is now yellow, with scarce a tinge of red." In Sept., 1859, Rev. J. B. Kearney, in a letter to Sir J. Herschell, printed in the 20th volume, number one, of the Monthly Notices of the Royal Astronomical Society, says, "By the way, the color of Capella seems much less blue than it used to be." To myself, at present its color appears to be a delicate pale blue.

6. Sirius. In the times of the old Greek astronomers Sirius was red. In the Middle Ages the Arabian astronomers did not name Sirius among the red stars, neither did the earlier astronomers of the west of Europe. Therefore, it seems probable that its color changed from red to white between the times of the Greek and those of the Arabian observers. Humboldt, as I have said, writes in 1850 of this star as being "perfectly white." Two years ago, when another change was observed by Dr. Wilcox, a friend of his, who was accustomed to distinguish nice shades of color, pronounced the light of Sirius to be purple, in which opinion he concurred. Four months ago, when he made the announcement to me, I regarded it as blue with a decided tinge of green. At present it seems to myself and some friends as the most deeply-colored star in the sky, but as more green than blue.*

* A 7th star, Procyon, is to be added to the above catalogue, its change of color having been ascertained a night or two after the presentation of the others.

This is, indeed, a very short catalogue, but I hope it will prove worthy of presentation if it shall serve for the beginning of one more extended; for, on theoretical grounds, I am strongly of the opinion that many more changes of color occur among the stars than have been observed and recorded.

February 17th.

Vice-President BRIDGES in the Chair.

Eighteen members present.

The following was presented for publication:

Catalogue of the N. American Sciænoids. By Theo. Gill.

The Committee on Proceedings laid on the table the published Number for October, November and December, 1862.

February 24th.

The President, Mr. LEA, in the Chair.

Seventeen members present.

On Report of the respective Committees, the following were ordered to be published:

Catalogue of the North American SCIÆNOID Fishes.

BY THEODORE GILL.

Since the publication of the several articles on the Sciænoids of the Eastern Coast of the United States,* the additional facilities which I have enjoyed have enabled me to detect some errors, adopted from previous laborers, in the nomenclature of those species, and I have been also led to propose some modifications in the arrangement of the family itself.†

A. Lower jaw received within the upper (vertebræ 10 | 14 —14 + X.)
  B. Teeth of both jaws developed; upper pharyngeal bones three.
    C. Lower pharyngeal bones completely separated ..... SCIÆNINÆ.
      * Chin smooth.
        † Caudal lanceolate; head above very broad, nearly flat between eyes; preoperculum behind crest cavernous and multipartite ..... Stelliferus.
        †† Caudal entire or sinuated; head narrow, transversely convex; preoperculum behind crest flat.
          1. Body and head oblong, compressed; anal under posterior half of second dorsal..... Bairdiella.
          2. Body and head elongated; anal under middle of second dorsal..... Sciænops.
      ** Chin with a single moderate barbel..... Menticirrhus.
      *** Chin with minute filaments..... Micropogon.

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* Catalogue of the Fishes of the Eastern Coast of North America, pp. 32, 33. (Feb. 14, 1861.)
Revision of the Genera of North American Sciæninæ, in "Proc. Acad. Nat. Sci., Philada.," 1861, pp. 79—89.
On the Liostominæ, op. cit., 1861, pp. 89—93.
On the Haploidonotinæ, op. cit., 1861, pp. 100—105.

† Note on the Sciænoids of California, op. cit., 1862, pp. 16—18.

CC. Lower pharyngeals firmly united in adult, with two oblique inferior processes beneath..... HAPLOIDONOTINÆ.
* Chin bearded; caudal subtruncated ..... Pogonias.
BB. Teeth of upper jaw only persistent ..... LIOSTOMINÆ.
Body compressed, ovate..... Liostomus.
AA. Lower jaw even with upper or projecting.....
B. Vertebræ 14 | 10 ..... OTOLITHINÆ.
A. Canine teeth in lower jaw; pseudobranchiæ..... Cynoscion.
BB. Vertebræ 10—11 | 14—15..... LARIMINÆ.
D. X. I. 24—30..... Larimus.

Subfamily *SCIÆNINÆ* (Bon.) Gill.

Genus STELLIFERUS (Stark ex Cuv.)

Les Stelliferes *Cuv.*, R. A., 1817, 283.
Stelliferus *Stark*, El. N. H., i. 459.*
Homoprion *Holb.*, Ich. S. C.

STELLIFERUS LANCEOLATUS Gill ex Holbrook.

Homoprion lanceolatus *Holb.*, 168.
Sciæna lanceolata *Günther*, ii. 289.
Hab.—South Carolina.

The poor description and figure of Holbrook did not enable me to recognize the generic identity of *Homoprion lanceolatus* with *Stelliferus trispinosus*, of which the examination of specimens has almost convinced me. *H. lanceolatus* has, however, pseudobranchiæ.

Genus BAIRDIELLA Gill.

BAIRDIELLA PUNCTATA Gill ex Linn.

Perca punctatus *L.*, Syst. Nat., ed. 10, i. 482, (No. 4.)
Bodianus argyroleucos *Mitchill*, Trans. L. and P. Soc. N. Y., i. 417.
" pallidus *Mitchill*, op. cit., p. 420; nec Morone pallida *Mitchill*, Rep., p. 18; nec *Labrax pallidus* Dekay, Storer.
Corvina argyroleuca *Cuv. et Val.*, v. 105.
Homoprion xanthurus *Holb.*, 170, pl. 24, (desc. and fig. 1, (nec 2); nec diag. brev.); nec *Leiostomus xanthurus* Lac., C. et V.
Corvina argyroleuca *Günther*, ii. 299.
Sciæna xanthurus *Gthr.*, pt. (nec desc.) ii. 288.
Bairdiella argyroleuca *Gill*, Cat. 33.
Homoprion subtruncatus *Gill*, (quasi ex *Holb.*,) Cat. 33.

The principal confusion in the nomenclature of this species is due to Dr. Holbrook, who considered it as "certainly the fish for which Lacépède established his genus *Leiostomus*" and never perceived its identity with the *Corvina argyroleuca* of the Hist. Nat. des Poissons.

Mitchill described it in his memoir on the Fishes of New York," in the "Transactions of the Philosophical Society of New York," as *Bodianus pallidus*, as well as *Bodianus argyroleucos*. The first name has been referred by all subsequent naturalists to the genus *Morone* on the authority of Mitchill himself; it is, however, evident that a diagnosis which describes the "tail even—*Lateral line extending through it*"—"Four or five holes under the chin"—"D. 9—23. A. 12," cannot be intended for a *Morone*, if the slightest confidence is reposed in the description; on the other hand, it agrees in these respects, as well as others, with the *Bairdiella*, and is unquestionably referrible to that genus, Mitchill himself, to the contrary notwithstanding; Dekay has

* The proper orthography of this name is *Stellifer*. Although the genus of Cuvier is the result of an error originating with Bloch as to the number of branchiostegal rays (4 instead of 7), it will doubtless be adopted, as the other generic characters are appropriate and peculiar.

remarked that he "had the authority of Dr. Mitchill himself for the identity of the species" with the *Labrax pallidus* (= *Morone americana*), and adds, that "there are, however, several grave errors in his description, some of which he assured me were typographical." The *Bodianus argyroleucos* is also undoubtedly the same species, and was characteristically figured by Mitchill.

Holbrook next made the nomenclature still more complicated. He has described and figured it under the name of *Homoprion xanthurus*,—strangely confounding it with the *Leiostomus xanthurus*, and affirming that it was "certainly the fish for which Lacépède established his genus *Leiostomus*." He has in his "specific characters" reproduced the diagnosis and radial formula of *Leiostomus xanthurus* from Cuvier and Valenciennes,* while in the full "description" he correctly describes the fins of *Bairdiella argyroleuca*.† Misled by his "specific characters," and neglecting to read his description of the fins, which I had supposed to be, like most of his others, merely a repetition in words of the radial formula of the diagnosis, I did not recognize its specific identity with *Bairdiella argyroleuca*, although especially alluding to its great resemblance to that fish in an article on the Sciænoids. Shortly after the publication of that paper, the second edition‡ of Holbrook's "Ichthyology of South Carolina." having been received at the Academy during a visit there, I immediately recognized the *Bairdiella* in the figure of *Homoprion xanthurus*, the rays being more distinctly represented than in the figure of the first edition, and consequently the small number at once arresting the attention. It was only then that I was led to examine the extended description of the fins. I have previously demonstrated that Lacépède's *Leiostomus xanthurus* is a true *Liostomus* as understood by Holbrook, who retains that generic name for a type which he believed was entirely unknown to Lacépède, referring the only species of that author to a new genus!

Genus SCIÆNOPS Gill.

According to Günther, the *Corvina ocellata* or *Johnius ocellatus* of American naturalists, belongs to a different genus from the type of *Johnius*. As it is equally distinct from *Sciæna*, to which it has been referred by Günther, a distinct generic name is requisite: that of *Sciænops* is therefore proposed; the only generic character recognized by Günther, is the weakness of the anal spine in comparison with that of *Johnius carutta*,—the *Corvina carutta* of Günther. The diagnosis of *Johnius* in the "Revision of the Genera of North American Sciænoids" is chiefly applicable to the present genus.

SCIÆNOPS OCELLATUS Gill ex Linn.

Perca ocellata *Linn.*, Syst. N., 483.
Lutjanus triangulum *Lac.*, iv. 181, 217.
Centropomus ocellatus *Lac.*, iv. 257, 279.
Sciæna imberbis *Mit.*, Trans., i. 411.
Corvina ocellata *C.* and *V.*, 134, pl. 108.
Johnius ocellatus *Girard.*
Sciæna ocellata *Gthr.*, ii. 289.

Hab.—Caribbean Sea, Gulf of Mexico and Eastern Coast northwards to New York; not found in fresh waters, (contra *Gthr.*, ii. 289.)

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* "Body above palest golden-brown; below silvery-white, without spots or bars; tail yellow. D. 11. 1—32. P. 21. V. 1—5. A. 2—13. C. 17."

† D. XI. I. 21. P. 14. V. I. 5. A. II. 9. C. 17.

‡ Dr. Holbrook, influenced by the hope of reclaiming the first edition of his work, has rendered the procurement of the second edition almost impossible by his order to his publishers, to only exchange the one for the other.

Genus MENTICIRRHUS Gill.

I. Body with obliqne bands.
  * Oblique bands only; six procurrent downwards under dorsals. Third dorsal spine shorter than head... M. alburnus.
  ** V-shaped band pointed downwards under first dorsal, and three oblique procurrent ones under second. Third dorsal spine equalling or exceeding length of head..... M. nebulosus.
II. Body silvery-white and immaculate ..... M. littoralis.

1. MENTICIRRHUS ALBURNUS Gill ex Linn.

Alburnus americanus, &c., *Catesby*.
Leuciscus (12) *Klein*, Fasc., ii. p. 67.
Perca alburnus *L.*, Syst. Nat., 482.
Centropomus alburnus *Lac.*, iv. 249, 257, 264.
Umbrina alburnus *Cuv.*, (1817,) *Holb.* Nec *U. alburnus* C. et V., Dekay, Storer, pp.
Sciæna alburnus *Gronov.*
Hab.—Eastern Coast northwards to New Jersey.

2. MENTICIRRHUS NEBULOSUS Gill ex Mitch.

Sciæna nebulosa *Mitch.*, Trans., i. 408, pl. 3, f. 5.
Umbrina alburnus pp. *C. et V.*, v. 180.
Hab.—Eastern Coast between Capes Cod and Hatteras.

3. MENTICIRRHUS LITTORALIS Gill ex Holb.

Umbrina littoralis *Holb.*, Ich. S. C., 142, pl. 20, f. 1.
Hab.—South Carolina.

Genus MICROPOGON Cuv.

MICROPOGON UNDULATUS C. et V.

Perca undulata *Linn.*, Syst. Nat., 483.
Sciæna croker *Lac.*, iv. 309, 314, 316.
Bodianus costatus, *Mitch.*, Trans. N. S., i. 417.
Micropogon undulatus, *C. et V.*, v. 219.
Micropogon costatus *Dekay*, 83.
Hab.—Eastern Coast south of New York.

In my uncertainty respecting the application of Cuvier and Valenciennes' names, I will not venture further on the synonymy. I am acquainted autoptically with only a single species as an inhabitant of the Eastern Coast, but there are, from the Gulf of Mexico, South America, &c., in the Smithsonian Institution's Collection, several differing in the form and size of the head, squamation, anal fin, &c.

Subfamily *HAPLOIDONOTINÆ* Gill.

Genus POGONIAS Lac.

Pogonathus *Lac.*

1. POGONIAS FASCIATUS Lac., iii. 137.

Labrus grunniens *Mitch.*, Trans. N. Y., i. 405, pl. 3, f. 3.
Hab.—Rhode Island southwards.

2. POGONIAS CHROMIS C. and V. ex L.

Labrus cromis *L.*, Syst. N., 479.
Sciæna chromis *Bl.*, *Schn.*, 82; *Lac.*, iv. 314.
Pogonathus courbina *Lac.*, v. 121.
Sciæna gigas *Mitch.*, Trans. N. Y., i. 412, pl. 5, f. 10.
" fusca *Mitch.*, l. c., 409.
Pogonias chromis.
Hab.—New York southwards.

Subfamily *LIOSTOMINÆ* Gill.

Genus LIOSTOMUS Lac.

LIOSTOMUS XANTHURUS Lac.

Leiostomus xanthurus *Lac.*, iv. 439, pl. 10, f. 1 ; *C.* et *V.*, (*Gthr.*, in Syn. pt.)
Homoprion xanthurus *Holb.*, 170, (syn. et sp. ch. ; nec desc. et fig.;) nec pl. 24, f. 2.*
D. XI. 1, 32—34. A.II . 13.
Color uniform.
Hab.—South Carolina to New York.

LIOSTOMUS OBLIQUUS Dekay ex Mit.

Mugil obliquus *Mitch.*, Trans. N. Y., i. 405.
Sciæna multifasciata *Les.*, Journ. Ac. N. S. Pa., ii. 225.
Leiostomus humeralis *C.* and *V.*, v. 141, pl. 110.
" obliquus *Dekay*, 69, pl. 60, f. 195 ; Holb., 164, pl. 24, f. 2, (nec f. 1.)
D. X. I. 30. A. II. 13.
Obliquely multifasciate ; humeral spot.
Hab.—Eastern Coast northwards to Massachusetts.

Subfamily *LARIMINÆ* Gill.

Genus LARIMUS Cuv. et Val.

LARIMUS FASCIATUS Holbrook.

Larimus fasciatus *Holb.*, 153, pl. 22, fig. 1.
Hab—South Carolina, in salt water, (not fresh.)

Subfamily *OTOLITHINÆ* Gill.

Genus CYNOSCION Gill.

Cestreus *Gronov.*, nec Cuv. et Val.

I. Body slender, spotted above as well as on the fins	C. carolinensis.
II. Body slender, with faint, oblique straight on back	
* Belly white	C. regalis
** Belly yellow	C. thalassinus.
III. Body robust, immaculate	C. nothus.

1. CYNOSCION CAROLINENSIS Gill ex C. V.

Otolithus carolinensis *C. V.*, ix., 475.
Cestreus carolinensis *Gronov.*, ed. Gray, 49.
Hab.—Northwards to New York.

2. CYNOSCION REGALIS Gill ex Bl.

Johnius regalis *Block, Schu.*, 75.
Roccus comes *Mitch.*, Rep.
Labrus squeteague, *Mitch.*, Trans. N. Y., t. 396.
Otolithus regalis *C. V.*, v. 67.
Hab.—Northwards to Maine.

3. CYNOSCION THALASSINUS Gill ex Holb.

Otolithus thalassinus *Holb.*, 132, pl. 18, p. 2.
Hab.—South Carolina.

4. CYNOSCION NOTHUS Gill ex Holb.

Otolithus nothus *Holb.*, 134, pl. 19, f. 1.
Hab.—South Carolina.

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*The pl. 24, f. 2, referred to for this species by Holbrook, who has thus led Guenther into error, is the *L. obliquus;* the fig. meant to be referred to represents *Bairdiella pallida.*

Systematic Arrangement of the Mollusks of the Family VIVIPARIDÆ, and others, inhabiting the United States.

BY THEODORE GILL.

My attention having been recently again attracted to the classification of the family of Viviparidæ by the printing of the "Descriptive Catalogue" of my friend, Mr. Binney, I propose to offer the following revision of the arrangement of the species of North America. There are four distinct groups of species on the continent which some will call genera, and others subgenera. These have been formerly comprehended under the generic name of *Paludina*, or *Viviparus;* the four were first recognized as distinct by Mr. G. W. Tryon, Jr., in "Notes on American Fresh-Water Shells."* The characters which appear to be the principal distinctive ones have, however, remained unnoticed by Mr. Tryon and all his predecessors, while those assigned to the respective groups have been rather vague and uncertain. A species closely related to, if not identical with, the type of *Viviparus*—*V. georgianus* ex Lea—has been referred by the Adams and Chenu to the subgenus *Melantho*, while, on the other hand, a true *Melantho*—*M. cyclostomatiformis*—is placed in *Viviparus;* the distinctive characters of the two groups, as given by those gentlemen, are by no means obvious.

It has recently been customary to consider the structure of the operculum as having a paramount value and indicating family distinction. On such grounds, the genus *Amnicola* has been separated from the family to which *Bythinia* was referred, and has by some been considered as the type of an independent one;† while others have referred it to the Melaniidæ,‡ Rissoidæ,§ or Littorinidæ,‖ Moquin-Tandon, to whom we are indebted for the most perfect account extant of the extra-marine mollusks of any country, has considered those differences to which others have assigned a family value as only subgeneric. That learned malacologist, in his precious work on the land and fresh-water mollusks of France, has combined in the genus *Bythinia*, the *Amnicolæ* and *Bythiniæ* of American and most other naturalists, giving to the former the sectional name of *Bythinella*, and to the latter, that of *Elona*. There can be little or no doubt that those groups differ generically, but they should apparently be approximated to form a family distinct from the true *Viviparidæ*.

I would then distinguish the two families as follows, my knowledge of the anatomical characters being chiefly due to M. Moquin-Tandon. But, in the first place, the following analytical synopsis of the families of Pectinibranchiates, represented in the fresh-water streams of North America, is offered. In this table, only the most striking and not always the most important characters are given.

I. Teeth of lingual membrane 3 | 1 | 3..... TÆNIOGLOSSA.
  A. Gills concealed.
    1. Rostrum moderately produced and entire or simply notched.
      a. Foot not produced beyond head: branchiæ uniserial.
        *Lateral jaws present. (Aperture of shell acuminate behind; generally chanelled at front; size moderate)..... MELANIIDÆ.
        **Lateral jaws obsolete. (Aperture of shell subcircular, broadly rounded at front; size very small)..... AMNICOLIDÆ.
      β. Foot produced considerably beyond the head; branchiæ triserial..... VIVIPARIDÆ.

* Proc. Acad. Nat. Sciences, Philadelphia, 1862. p. 451.
† *Tryon*, op. cit., supra, 1862, p. 451
‡ *Lea*, Proc. Acad. Nat. Sciences, of Philadelphia, 1862.
§ H. & A. Adams, Chenu, Binney.
‖ Gray.

II. Rostrum produced, extending into two much elongated, subulate lobes..... AMPULLARIIDÆ.
AA. Gills pinnate, plumose and exsertile forwards..... VALVATIDÆ.
ii. Teeth of lingual membrane $x \mid 4.1.4 \mid x$; central very unequal; lateral slender, hooked and very numerous... RHIPIDOGLOSSA.
Shell with a straight, flattened columella..... NERITIDÆ.

Size, in the several families above enumerated, is, as a rule, correlative with structure. The *Ampullariidæ* are comparatively large; the *Viviparidæ* moderate; the *Melaniidæ* smaller, and the *Valvatidæ* and *Amnicolidæ* generally may be almost said to be minute.

The family of MELANIIDÆ is here restricted to exclude *Faunus* Montfort, (=*Pirena* Lam.), *Melanatria* Bowdich, *Melatoma* Sw., (= *Clionella* Gray,) *Melanopsis* Lam., *Vibex* Oken and *Hemisinus* Sw. These appear to belong to a distinct family equally distinguished by the projecting foot of the animal and the notch of the aperture of its shell. The family may be named MELANOPIDÆ. The other genera or subgenera that have been proposed scarcely appear to exist in nature. There is, however, one form which has received no name; it embraces the species figured by Chenu, under the names of *Melanopsis princeps* (Lea) and *M. acicularis* Ferussac. This genus is most nearly allied to *Faunus*, with which it agrees in physiognomy, but is distinguished by the *absence of a posterior sinus* of the outer lip; it may be named FAUNOPSIS.* The American Melaniidæ form a peculiar subfamily,—*Ceraphasiinæ*.

The AMNICOLIDÆ of North America may be distributed among two subfamilies,—AMNICOLINÆ and BYTHININÆ. The Amnicolinæ represent, apparently, three genera,—*Amnicola*; *Chilocyclus*† (Gill), with the circular lip reflected, and with a shell like *Amnicola*, and *Somatogyrus*; (n. g.)‡ with the body whorl globose, and the aperture obliquely semicircular. The validity of *Pomatiopsis*, as defined by Tryon, is for me very doubtful.

The Ampullariidæ are represented by the genus *Ampullaria* Lam.

The Valvatidæ are divisible among two genera—*Valvata*, from which Tropidina is apparently not separable, and *Lyogyrus*, (n. g.)§ in which the last whorl is separated from the preceding and revolves within the normal spiral of increase.

The families of Viviparidæ and Amnicolidæ may be further distinguished by the following characters, which are essentially the same as those used by M. Moquin-Tandon to distinguish the so-called "genera" *Paludina* and *Bythinia*. The contrast is made simply because the genera have been confounded under one family, for they are really less related to each other than *Bythinia* is to the Melanians, or some other families.

Family *VIVIPARIDÆ* (Gray,) Gill.

Animal oval, entirely retractile within the shell. Foot oval, much dilated, passing beyond the muzzle, and provided with an anterior groove. Jaws two,

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* FAUNOPSIS (*Faunus*, mythological name and Οψις,) *Melanopinæ*.—Testâ elongatâ, subulatâ, aperturâ parvâ rhombo-ovata, postice acutâ, antice bene sinuata, labro externo acuto, nec sinuatâ.

Type. *Melanopsis princeps* Lea.

† CHILOCYCLUS (Χειλος, lip, and Κυκλος, circle.)—Testâ conicâ, anfractibus convexis, aperturâ modicâ, circulari, labro reflexo.

Type. *Cyclostoma cincinnatensis* Lea.

‡ SOMATOGYRUS (Σωμα-τος, body and Γυρος, whorl.)—Testâ anfr. primo globoso, spirâ parvâ, aperturâ obliquiter semi-circulari, labro externo acuto.

Type. *Amnicola depressa* Tryon.

§ LYOGRYRUS (λυω, to loose and γυρος, whorl.)—Testâ oblongâ, anfr. convexis. anfr. ultimo disjuncto, aperturâ circulari.

Type. *Valvata pupoidea* Gould.

lateral, narrow and convex. Tentacles cylindrical, subulate, obtuse, with the eyes on very short peduncles towards their external inferior third. Branchiæ in three rows, in the form of flattened filaments, slightly subulate, and scarcely dilated towards the inferior third.

Generative organs on the right side; verge internal, simple and contained in the tentacle; female orifice under the border of the mantle on the same side.

The genus *Viviparus*, or the Viviparidæ of this synopsis, are the only mollusks which appear to undoubtedly belong together; of the other genera that have been referred by the Adams, Gray and Chenu to the family, *Tanalia* and *Paludomus* are apparently rather related to the Melaniidæ, and nearly agree in form of the shell, with *Leptoxis* of Raf. or *Ancylotus* of Say, while the structure of the animal, as far as described, is essentially similar to that of the true Melanians* and they agree with *Viviparus* only in possessing an operculum whose elements are concentric, but which is in other respects quite different. The genera *Laguncula* of Benson, and *Rivulina* of Lea, are unknown to me.

All the known types of Vivipari are represented in the United States.

Tulotoma *Hald.*

Viviparus *Lam.*

Melantho *Bowd.*

Lioplax *Trosch.* = Haldemania *Tryon.*

Family *AMNICOLIDÆ* (Tryon,) Gill.

Animal oval or elongated, completely retractile within its shell. Foot oval or rounded, generally narrow, and not continued in front of the rostrum. Jaws obsolete. Tentacles cylindrical setaceous, pointed, with the eyes sessile at their postero-external bases. Branchiæ in a single row, in the form of transverse folds, somewhat dilated at the middle. Generative organs on the right side; verge external, behind the tentacle, bifid and with unequal branches; female orifice under the margin of the mantle, on the same side.

The following types belong to this family:

Amnicola *Gld.* and *Hald.*; Chilocyclus *Gill*; Somatogyrus *Gill.*

Bythinia *Leach.*

The subgenus *Bythinella* of Moquin-Tandon corresponds to the genus *Amnicola* of Gould and Haldeman, and consequently should be so treated, although its first species apparently belong to the subgenus *Pomatiopsis* of Tryon;† the materials now in my possession, or in the Smithsonian Collection, do not enable me to form a satisfactory opinion concerning that group: at present, I am disposed to doubt its distinction from *Amnicola.*

In the present paper it is proposed to classify only the Viviparidæ.

The family of Amnicolidæ has been recently proposed by Mr. Tryon for the genus *Amnicola*, but that gentleman has given no diagnosis. It is more nearly allied to the Melaniidæ than to the Viviparidæ, and the genus *Amnicola* has been referred to that family by Mr. Lea.

The material of the Smithsonian Institution, &c., being now in the hands of Mr. Binney, I am unable to arrive at a satisfactory conclusion regarding the limits of our species, and, while expressing my opinions on the classification of our species by reference to those admitted by Binney, except in a single case, I feel somewhat disposed to dissent from him in several instances. As such a difference of opinion would not necessitate any modification of the distribution among groups here proposed, I do not feel at liberty to dissent from him at the present time.‡ I have seen specimens of almost all the species enumerated.

* The American Melaniidæ, so far as I know, have not a fringed mantle and consequently belong to a different group.

† The subgenus, as defined by Tryon, is alluded to; the type of that group (A. *lapidaria*) may, however, be quite different, and a representative of the family Aciculidæ.

‡ The identification of *Paludina Elliotti* Lea, with P. *cyclostomatiformis*, is most doubtful. I am disposed to believe that, while the latter is a true *Melantho*, the former is a

The forthcoming work of Mr. Binney, some time since issued as "proof," however naturalists may be disposed to differ from him, will be of considerable value, as the full descriptions and figures of all real, as well as nominal species, are copied, and the labor and time of referring to many separate volumes, some of great rarity, will be thus saved.

Family *VIVIPARIDÆ* (Gray,) Gill.

Animal elongated, semicylindrical, with the spiral visceral sack contained in a turbinate shell, into which the rest of the body is also perfectly contractile. Mantle encircling the neck with a very thin fold, simple in front. Foot, distinct from the neck, moderate, extending beyond the head, arched in front, and obtusely extended towards its angles, rounded behind; adapted only for crawling. Head moderate, with the rostrum produced, entire or nearly so in front above. Jaws two, lateral. Tentacles two, contractile, with the eyes on short tubercles on the outer sides of their bases. Lingual ribbon strong, slender and elongate. Teeth in seven longitudinal rows, (3 | 1 | 3) laminar, with recurved apices; lateral convergent.

Branchiæ internal, and along an oblique line down the left side of the branchial cavity, in three regular rows, composed of flattened, slightly subulate filaments, scarcely dilated towards the posterior third (in types). Respiratory orifice under the collar, at the upper and hinder part of the neck. Generative organs, unisexual, on the right side; verge at the end of the tentacle, in which the deferent canal is contained. Female orifice on the same side, under the margin of the mantle.

Shell turbinate, conoid, covered with a thin, transparent, or rather thick, greenish, or olive periostraca; with the septa persistent; the aperture subovate, and with a continuous peritreme.

Operculum annular.

The shells of the groups and genera of the family represented by American species are distinguished as follows:

α. Shell subconic; lips continuous on a uniform plane..... VIVIPARI.
  1. Shell with revolving nodulous carinæ. Aperture slightly effuse at base..... *Tulotoma.*
  2. Shell with the whorls smooth. Aperture broadly rounded at base..... *Viviparus.*

β. Shell turreted. Outer lip subangulated, sinuous or incurved at base..... LIOPLACES.
  1. Operculum with concentric elements..... *Melantho.*
  2. Operculum with a spiral nucleus..... *Lioplax.*

The groups of Vivipari and Lioplaces, among which the American Viviparidæ may be thus distributed, are decidedly distinguished by differences of dentition, which are coincident with the well marked conchological characters. The dentition of *Viviparus*, *Melantho* and *Lioplax* has been examined; although that of *Tulotoma* is still unknown, it is not probable that it will be found to exhibit any important difference when compared with the dentition of *Viviparus*.

Group VIVIPARI.

The rachidian teeth are broad, rather wider and more or less angulated towards the base; recurved at their superior margins, which are also *denticulated*

Lioplax; and in this opinion I am supported by Mr. Tryon. Although autoptically unacquainted with *P. Elliotti*, I judge from the figure that the form of the aperture and the carination of the whorls are alike in both; the operculum of *P. Elliotti* is unknown; a knowledge of its structure will decide the doubts concerning the affinity of the species. I am not acquainted with the reasons influencing Mr. Binney in his union of the two species. The arguments in favor of a union of so dissimilar species might not be undesirable, for an examination of the figures alone would scarcely "convince one of the identity" of the two, but rather produce a contrary belief.

on each side of a central lobe or tooth. The inner teeth of the pleura are also broad, oblong, often narrowed near the base, and with the upper margins denticulated; the median and outer rachidian teeth are narrow, with the upper margins subtruncated and denticulated.

TULOTOMA Haldeman.

Tulotoma *Haldeman*, Supplement to No. 1, of a "Monograph of the Limniades," &c., of N. A., p. 2. "Oct., 1840."

Shell imperforate, conic, rather thin, becoming more elongated and conic in its progress to maturity, with the whorls little convex; whorls in adult with two nodulous revolving carinæ, the lower of which is covered by, but produces a ridge beneath the suture of the succeeding whorl. Aperture obliquely semicordate, slightly effuse at base; lips continuous in a uniform plane; outer lip thin; columellar lip straight or little concave and obtusely conuected behind with the outer.

Operculum corneous, with its elements entirely concentric.

Tulotoma is represented by only one species inhabiting the streams of Georgia and Alabama. It is readily distinguished from the typical *Vivipari*, to which it appears to be most nearly allied, by the form of the aperture, the nodulous carinæ of the adult shell, and also by the form of the adult shell itself. The adult has been described as "heavy," but it does not appear to be really much more so than that of *Viviparus*.

Tulotoma magnificum *Tryon ex Conrad.* = Vivipara magnifica *B. ex Conrad.*

VIVIPARUS Montfort ex Cuv.

Vivipare *Cuv.*, 1808, Lam., 1809.
Viviparus, *Montfort.*

Shell imperforate or rimate, conic or subconic, thin, with the whorls convex or rather flattened, smooth or carinated. Aperture obliquely oval and rather wide, broadly rounded at base. Lips continuous on a uniform plane; outer lip thin, columellar lip concave, closely appressed behind to the body whorl and forming nearly a right angle with the outer.

Operculum corneous, with its elements wholly concentric.

Viviparus, as here restricted, is a very natural and widely-distributed group. Its chief distiuctive character is the form of the aperture and outer lip. The American species of the genus or subgenus are divisible among three sections, distinguished by a difference of form.

§ I.

Shell ventricose, with very convex, smooth whorls.

Viviparus lineatus ex *Val.* = V. vivipara *Binney*, pp.
Viviparus Wareanus ex *Shutt.*, *Binney.*
Viviparus Troostianus ex *Lea*, *B.*
Viviparus intertextus ex *Say*, *B.*
Viviparus coosaensis ex *Lea*, *B.*

The *V. subglobosa* (Binney ex Say) is known to me only through descriptions. Mr. Binney is inclined to doubt its pertinence to this genus, but would rather refer it to the same group as *Leptoxis isogona*, *L. pallida*, and *L. altilis.*

§ II.

Shell with the whorls more or less flattened obliquely, or in the direction of the spire, smooth or carinated.

Viviparus subpurpureus (*Ad.*) *ex Say.*

§ III.

Shell with the whorls ornamented by revolving carinæ, two of which are visible on each covered whorl.

Viviparus multicarinatus (*B.*) *ex Hald.*

The third section of *Viviparus*, or another closely related to it, perhaps includes *V. bengalensis* (Ad.) ex Lam., *V. borroughianus* Gill ex Lea, *V. bilineatus* Gill, and other Indian species; the suspicions that might be entertained as to the strict affinity of species so widely separated geographically, can only be relieved by an examination of the mollusks themselves; the shells are very similar.

The genus *Viviparus* is represented by a number of species in the lignite beds of Fort Union which have been referred by Messrs. Meek and Hayden to the Eocene epoch. My friends, Messrs. Meek and Hayden, have adopted the same conclusions as myself regarding the distinction of *Viviparus* and *Melantho*, and have now referred, with myself, six of the species formerly described by them, to *Viviparus*, accepting that name, and two others to *Melantho*. Five of those species are distributable among the three groups above indicated, while the sixth is the representative of a distinct one. The following list shows their affinities:

§ I.

Viviparus Leaii *M. and H.*

§ II.

" retusus *M. and H.*
" Conradi *M. and H.*

§ III.

" trochiformis *M. and H.*
" Leidyi *M. and H.*

§ IV.

Shell rather thick, with numerous revolving lines, sometimes obsolescent.
Viviparus Raynoldsianus *M. and H.*

These species will be illustrated and fully described in the forthcoming work of Meek and Hayden on the Fossils of the Upper Missouri country.

In the beds at Fort Washington on the banks of the Potomac River, which probably belong to the Post Pliocence epoch, a species of *Viviparus* is found in great numbers, which appears to be referrible to the *V. subpurpureus;* the latter is now only known to exist in Florida and the Western States. Mr. L. E. Chittenden first obtained specimens from Fort Washington; Mr. Binney also considers the specimens to be referrible to the *V. subpurpureus.*

Group LIOPLACES.

The rachidian teeth are broadest and angulated at the base; *narrowed* above, and recurved, *with* the *margins entire.* The *inner* teeth of the pleura are oblique, oblong, recurved and entire; the *median* and *outer* pleural teeth are also entire, obliquely recurved, narrowed and terminating each in a point, or *claw-shaped.*

MELANTHO Bowdich.

Shell imperforate or rimate, turreted, thick and of very compact structure, never provided with colored bands, with the whorls more or less compressed longitudinally, smooth or rarely carinated. Aperture obliquely semi-cordiform, rather narrow, broadly rounded and sinuous or retreating backwards at the base, the outer lip trenchant, and produced near the base; columellar lip nearly straight, closely appressed to the body whorl and forming nearly a right angle with the outer.

Operculum corneous, with its elements wholly concentric.

Melantho is a type peculiar to America, I believe. It is readily recognizable by the peculiar physiognomy of the shell, produced by the compression of the whorls in a longitudinal direction, so that the sides of each are nearly parallel, and a turreted form is thus obtained. It may be therefore likened, as to form,

to the genus *Latrunculus* of Gray, or *Eburna* of others.* The shell structure appears to be more compact than in the typical *Vivipari*, and the species generally are more ponderous. The angulation of the outer lip and the sinus at the base are characteristic, and contrast strongly with the uniform plane of the aperture of *Viviparus*.

The figure of a "deformed" *V. decisa* (36) published by Binney, gives an exaggerated idea of this peculiarity of form.

The soft parts of *Melantho* appear to also differ from those of *Viviparus*, the rostrum being smaller and less protractile, and the auricles behind the tentacles are likewise much smaller.

The earliest known American species of *Melantho* were contemporaneous with the *Vivipari*, three species having been discovered by Dr. Hayden in the lignite beds of Fort Union and described by Meek and Hayden as *Vivipara multilineata* (=*V. nebrascensis* M. and H.), *V. vetusta* and *Melania* or *Lymnæa multistriata*. These have now been referred to the genus *Melantho* in the manuscript work of Meek and Hayden.

Melantho multilineatus.
" vetustus.
" multistriatus.

The following are referrible to the same genus,—*Melantho:*
Melantho ponderosa *Ad. ex Say* = V. ponderosa *B.*
" decisa *Ad. ex Say* = V. decisa *B.*
" coarctata *Gill ex Lea* = V. coarctata *B.*
" cyclostomatiformis *Gill ex Lea* = V. cyclostomatiformis *B.*
" incrassata *Ad. ex Lea* = V. incrassata *B.*
" decapitata *Gill ex Anth.* = V. decapitata *B.*
" regularis *Gill ex Lea* = V. regularis *B.*

LIOPLAX Troschel.

Lioplax *Troschel*, Gebiss der Schnecken, p. 100, 1857.
Haldemania *Tryon*, Proc. Acad. of Nat. Sciences, 1862, p. 451.
Paludina sp. auct.
Vivipara sp. auct.

Shell imperforate or rimate, turreted, rather thick; of very compact structure; unprovided with colored bands; whorls carinated and longitudinally flattened, with the sides nearly parallel. Aperture little oblique, oblong-oval, broadly rounded at the base, and sinuous or retreating backwards, the sharp outer *lip* being subangulated near the front; columellar lip concave appressed to the body whorl, forming an obtuse angle with the outer.

Operculum corneous, with a large spiral nucleus, but with the subsequent accretions concentric.

This type is evidently most nearly related to *Melantho*, but differs especially in the spiral nucleus of the operculum, as well as in the form of the aperture. A single species is found, which has been ascertained to inhabit some of the streams of Ohio, Indiana, Kentucky, Pennsylvania and New Jersey. We are indebted for its subgeneric distinction to Prof. Troschel and Mr. Tryon.

Lioplax subcarinata = Haldemania subcarinata = Vivipara subcarinata *B. ex Say.*

NOTE.—I regret that I have not been able to avail myself more fully of the invaluable "Gebiss der Schnecken" of Dr. Troschel. The four parts were only received at the Smithsonian Institution, through the kindness of Prof. Agassiz,

* The name of *Latrunculus* has been recently applied by Dr. Günther to a genus of Gobioid fishes, but, if no other reasons, cannot be retained on account of preoccupation of the name. The genus had, however, previously received the name of *Aphya* from Risso.

the day before the reception of the proof of the foregoing paper, and consequently too late to compare my views with those of the distinguished author. I am happy to find that the validity of the groups of Viviparidæ, which have been above defined, is confirmed by the researches of Dr. Troschel, who has examined the dentition of several species of true *Viviparus*, besides that of the *Paludina subcarinata* of Say, for which he has proposed the name *Lioplax*. The latter name is now substituted for *Haldemania* of Tryon, and is modified to form the name of a group containing that genus and Melantho.

Additional Remarks on the North America ÆGIOTHI.

BY ELLIOTT COUES, A. M., M. D.

Since the publication in the Proceedings of the Academy for November, 1861. of my Monograph of the genus, the Smithsonian has been constantly in the receipt of additional specimens from all parts of North America. These were mostly the *A. linarius;* but collections from the North have usually contained a number of well-characterized examples of *A. exilipes*. Nothing, however, of special importance has been elucidated, until the reception of a series collected in winter in the vicinity of Quebec. These specimens, as they throw much light on the variations of the typical species of the genus, *A. linarius*, will merit a brief notice. If the deductions I have drawn from these specimens are warrantable, we have in North America the forms long recognized in Europe as *A. Holbölli* and *A. rufescens;* and these are both rather races than distinct species.

Selecting from the series two or three skins which differ most markedly from the usual style of *linarius*, and comparing them with a typical specimen of the latter from Philadelphia, I find the following differences:

The bird is very decidedly larger. The difference in total length is nearly one inch, as near as I can judge from the dried skins. The wings and tail are each about a fourth of an inch longer. The tarsus and middle toe with its claw are together about two-tenths of an inch longer.* The bill and feet are decidedly larger and stouter, though perhaps not disproportionately so. The former is somewhat elongated; its lateral outlines straight instead of a little concave; its culmen slightly curved. The bill is of a bright chrome-yellow, except just along the culmen and at the extreme tip. The gular spot seems rather large. In other respects, the two birds are quite identical, for, with these differences in size, there is an exactly proportionate increase in the bill, feet, wings and tail; and the colors of the two do not differ appreciably, except in the bill, and perhaps the larger gular spot. The specimens give the idea, in fact, of overgrown individuals of the common *linarius*.

But now, on examining in detail the rest of the series, I find that, from the one extreme, the characters of which have just been given, there is a complete and gradual transition,—a diminution in size, down to specimens which cannot possibly be distinguished from typical *linarius*. There is no break in the series; no dividing point where we can stop calling the specimens "*linarius*" to give them another name; in spite of the discrepancy which is so evident between the two extremes.

The point of interest which attaches to these specimens, is the bearing they may have on the mooted question of the claims of *Ægiothus Holbölli* to full specific rank. As was the case at the time of the preparation of my Monograph, I have never examined a specimen which professed, upon good European authority, to be that species. Careful examination, however, of the

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*The tarsus, middle toe and claw together, of the specimens under consideration, measure absolutely 1·20 inches; the same parts in *linarius* are about one inch: in *exilipes* ·80 of an inch.

figures and diagnoses of the various authors who have treated of this bird has shown that there are assigned to *Ægiothus Holbölli*, as distinctive characters, exactly those differences from the *linarius* which exist in the specimens under consideration,—viz.: larger size, larger, more elongated and bright yellow bill, and larger gular spot. I thiuk there can be no reasonable doubt that these specimens represent in North America the form long recognized in Europe under the name of *Ægiothus Holbölli*.

If this be the case, next comes the question, what rank are we to accord to this form. Is it to be looked upou as an accidental variation from the type,—as a well marked variety,—or as a distinct species? Brehm was the first to proclaim it as distinct, and give it a name. Temminck, Schlegel, Bonaparte, and other authors,—who are rather more orthodox in their ideas of a species than is Brehm,—have always inclined, more or less decidedly, to the opinion that it is rather a race or subspecies of *A. linarius*. The fact of there being a complete gradatiou towards the *linarius*, has not escaped attention, and has been a powerful argument against according to it full specific rank. For my own part, though unable to demonstrate the poiut incontrovertibly, I am inclined to reiterate still more strongly the doubts expressed in my Monograph, as to the propriety of separating it from the *linarius*.

Pursuing this question of the variations which *A. linarius* presents, we find another species,—*A. rufescens*,—which has never been able to fully vindicate its claims to specific distiuction. First introduced by Vieillot, its existence was strenuously denied by Temminck, doubtfully regarded by Bonaparte and Schlegel, and admitted by Cabanis and others. I have always entertained strong doubts as to its validity. The characters assigned are slight enough; and that they exhibit a gradation towards *A. linarius*, is admitted even by those who contend for its separation from that species. In examining two hundred or more specimens, I find many individuals, fully as small, in fact, and with as much of a reddish tinge, as specimens from Europe labelled "*rufescens*" by good authority.

The existence, then, in North America of these two races, or species, whichever they may be, the one larger and the other smaller than the typical *linarius*, may be considered as exceedingly probable, if the fact be not actually demonstrable. As a sort of negative argument, I may remark, that one might naturally look for their occurrence in this country, as the typical *linarius* from Europe is absolutely identical with our own.

Ægiothus rufescens and *A. Holbölli*, compared with *A. exilipes*, afford a good illustration of the limits between which a species may vary from its normal type; while another species, looking at first glance more like this type than do either of its extremes, is permanently distinct.

I have no reason to change any of the views expressed with regard to three new species I have introduced. Additional specimens confirm the position assumed, especially regarding *A. exilipes*. I may here, however, correct a typographical error, which gives the date of the first iutroduction of *A. fuscescens* as "Aug., 1860," instead of "Aug., 1861."

March 3d.

Mr. Jos. Jeanes in the Chair.

Twenty members present.

The following paper was presented for publication:

Enumeration of the plants collected by Dr. Parry, and Messrs. Hall and Harbour, in Colorado Territory. By Asa Gray.

March 10*th*.

Vice-President VAUX in the Chair.

Twenty members present.

The following paper was presented for publication :

On Trachycephalus, Scaphiopus, &c. By E. D. Cope.

Mr. Cope mentioned that a fish obtained by Jesse Burke, in the cedar swamps of New Jersey, he had determined to be a new species, for which he proposed the name of Hololepis simus.

March 17*th*.

Vice-President BRIDGES, in the Chair.

Twenty-five members present.

The Publication Committee laid on the table Part 3 of Volume V. of the Journal, just published.

March 24*th*.

The President, MR. LEA, in the Chair.

Twenty-five members present.

The following papers were presented for publication :

Catalogue of the Fishes of California, Part 4. By Theodore Gill.

Descriptions of new species of Pediculati, &c. By Theodore Gill.

Additions to the Catalogue of Stars which have changed their colors. By Jacob Ennis.

Tetraolagophus, White Grouse, &c. By James A. Grant, M. D.

Dr. Leidy directed attention to some portions of the aorta of a horse, containing parasitic worms, presented this evening by Dr. R. Jennings, veterinary surgeon. The worms belong to the species Sclerostomum armatum. A letter from the donor, giving an account of the case, observes :

"The horse appeared generally in good condition, and was a yearling colt. It was taken with symptoms of prostration, and slightly hurried respiration, and died four hours after the attack was noticed. Patches of inflammation were observed in various parts of the intestines, and several of the mesenteric glands were of a dark bloody appearance, and contained clusters of small worms. Parasites of the same character were noticed in the liver, and on the exterior of the kidneys. A clot of blood, the size of a goose egg, was found between the coats of the left iliac vein, and contained a large number of the worms. They appeared to have perforated the internal coat of the vein, and thus caused the extravasation of blood. The worms were also observed in small clusters contained in the coats of the thoracic aorta."

Dr. Leidy also exhibited a specimen of sheep wool, striped alternately black and white, which was presented this evening by Mr. Joseph P. Hazard. In a note the donor observes, that his brother, Mr. Rowland G. Hazard, of Peace Dale, R. I., who gave him the specimen, stated that in an experience of forty years' connection with the manufacture of the article, he had never before seen anything of the kind.

Mr. Vaux exhibited an Indian axe, of native copper, from a mound near Hamilton, Ohio.

The Committee on Proceedings, laid on the table the published number for January and February.

[Mar.

March 31*st*.

The President, MR. LEA, in the Chair.

Twenty members present.

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

On TRACHYCEPHALUS, SCAPHIOPUS and other American BATRACHIA.

BY E. D. COPE.

TRACHYCEPHALUS, Tsch.

In the most recent enumeration of the species of this genus (by Dr. Günther, 1858,) four are recognized: one,—T. g e o g r a p h i c u s,—from Brazil, and three from the Antilles. I am enabled to add four to the latter, which have been sent from those regions by Messrs. Wright and Weinland, and Professors Poey and Adams, all well known as most efficient laborers in advancing our knowledge of zoology in that field.

It does not appear to have been stated that the males of certain species of this genus, —T. m a r m o r a t u s, i n s u l s u s, o v a t u s, —possess, during the breeding season, a corneous sheath upon the tuberiferous metacarpus of the inner anterior digit, as occurs in Discoglossus and Scaphiopus. Specimens of males in which the generative organs are not enlarged, are destitute of this pellicle; it is, however, readily lost after saturation in fluid. Its object here, as elsewhere, is to assist the powers of prehension of the male.

The following table contrasts the peculiarities of the West Indian species:

A. Posterior margin of area of cephalic dermoössification continuous with the skin of the nape;
  a. Without distinct cordiform outline.
    β. Its length from end of muzzle equal to breadth of jaws opposite middle of orbits.
Muzzle acuminate; tongue entire; fingers scarcely webbed i n s u l s u s.
Muzzle rounded; tongue cordate; fingers well webbed..... o v a t u s.
    ββ. Length of casque from end of muzzle less than breadth of jaws opposite middle of orbits.
Skin tuberculous; heel scarcely reaching muzzle; casque concave in posterior outline..... m a r m o r a t u s.
Skin nearly smooth; heel reaching beyond muzzle; casque straight in posterior outline..... ..... w r i g h t i i.
  αα. Casque with posterior cordate outline complete from orbits;
Canthus rostralis nearly straight..... s c u t i g e r u s.

AA. Posterior margin of casque elevated, crest-like.
Length from muzzle to border of casque much less than breadth of jaws at middle of orbit..... l i c h e n a t u s.
Length from muzzle to border of casque equal or greater than breadth of jaws at middle of orbit..... a n o c h l o r u s.

T. i n s u l s u s *Cope*, sp. nov.

Head elongate, outlines converging toward end of muzzle. Length from that point to posterior border of casque equal to distance across mouth at orbits. Top of cranium plano-concave, end of muzzle prominent, rounded in profile. Posterior outline of casque straight or slightly emarginate, extending nearly to tympanum. Canthus rostralis strongly marked, with a slight point or ridge one-third distant from orbit. Loreal region concave. Eyes very prominent, twice extent of tympanum. Vomerine teeth in transverse series. Internal nares equal ostia pharyngea. Tongue not emarginate. Skin of upper surfaces

sparsely tuberculous. Three external digits one-fourth webbed. Heel reaching a little beyond orbit. When the markings of the upper surfaces are not obsolete, there is a brown band converging from the supercilium towards one upon the other side, then diverging, and becoming broken up on the iliac region. Lateral and posterior femoral regions marbled; extremities banded.

Length from muzzle to posterior margin of casque 16‴;* least breadth between orbits 8‴. From casque to vent 4″ 5‴; anterior extremity 3″ 5‴; posterior extremity 8″ 8‴.

Habitat.—Cuba. From Prof. Poey. Mus. Smithsonian, Nos. 6265–6. Academy Natural Sciences.

T. o v a t u s *Cope*, sp. nov.

Length from extremity of muzzle to posterior border of casque equal to breadth from one os maxillare to the other at orbits. Head depressed, especially anteriorly; maxillary outlines much rounded, not acuminate. Muzzle rounded in profile. Canthus rostralis strong, but little concave, far within maxillary border; loreal region grooved. Posterior border of casque extending nearly from tympanum to tympanum, slightly doubly-convex. Eyes very prominent, more than twice the extent of the tympanum. Internal nares larger than ostia pharyngea. Tongue emarginate. Vomerine teeth between nares, in two postero-externally divergent series. Digits of anterior extremity nearly half-webbed. Heel reaching nearly to end of muzzle. Skin of upper surfaces nearly smooth.

Length from end of muzzle to posterior border of casque 1″ 7‴. Least width between orbits 7‴. Length from casque to vent 4″ 5‴; of anterior extremities 3″ 6‴; of posterior extremities 8″ 5‴.

Above deep brown, beneath immaculate; upper faces of extremities indistinctly barred; lateral and posterior femoral regions spotted, and marbled with brown.

Habitat.—Hayti, near Jeremie. Dr. Weinland's Collection in Mus. Comparative Zoology, Cambridge.

Perhaps this is the *T. dominicensis* Gthr., which does not appear to be the species so named by Duméril and Bibron.

T. m a r m o r a t u s *Dum., Bibr.*

Head short; maxillary outline broadly oval. Length from end of muzzle to posterior border of casque less than from one alveolar margin to the other at orbit. Frontal region concave, especially in old individuals. End of muzzle nearly vertical in profile. Casque extending from tympanum to tympanum in fully developed individuals; the posterior outline openly emarginate or concave. Canthus rostralis convergent, concave, but little elevated, with a more or less obsolete furcation or process, one-third of its length anterior to the orbit. Loreal region very oblique, concave. Orbits twice the extent of tympanum. Series of vomerine teeth either transverse, arcuate or oblique converging anteriorly. Posterior nares moderate. Tongue not or scarcely emarginate. Skin of upper surfaces coarsely, usually closely, tuberculous. Two external digits of anterior extremity very slightly palmate. Heel of extended extremity reaching from anterior to the orbit to near end of muzzle.

Length from end of muzzle to middle of posterior margin of casque (in ♀ from New Providence) 22‴. Breadth between orbits 12‴; length from casque to vent 5″ 6‴; of posterior extremity 11″ 5‴. Length of head and body in ♂ (from New Providence) 4″ 6‴.

Specimens of this species in alcohol are either rufous brown, varied with dark brown, blackish brown, ashy, with confluent brown spots, or olivaceous, with close brown or black reticulations.

Habitat.—Cuba, De La Sagra, Poey. New Providence, Wood, Bryant. Hayti, Weinland, Cuming, ?Ricord. Jamaica, Gosse, Adams. Mus. Academy Nat.

* The centimetre and millimetre are used in this paper.

Sciences, Philada.; Boston Nat. Hist. Soc.; Compar. Zoology, Cambridge; Smithsonian, Washington.

The palmation of the fingers in this species varies between bare existence and an extent equal to one-fourth the length of the digits. The series of vomerine teeth are either arched or straight. As the peculiarities of the *Hypsiboas dominicensis* of Tschudi, as defined by Duméril and Bibron, are exhibited within this range, I am induced to believe that it is but a nominal species. The *dominicensis* of Günther, possessing a more extensive palmation of the anterior digits, is so far similar to the ovatus from the same island. I agree with that author in assigning the same name to the Jamaican animal, which is, according to him, the frog called *Hyla brunnea* by Mr. Gosse. The specimens labelled erroneously in Mus. Paris as having been brought from Cape North, in Norway, under the name *Hyla septentrionalis*, belong to the present species according to the "Erpétologie Générale." It is the oldest name, but, being but a museum label, must be passed over.

Specimens from New Providence are of large size and with golden and olivaceous shades.

T. wrightii *Cope*, sp. nov.

Head short, broadly rounded; length from end of muzzle to posterior border of casque less than breadth of mouth opposite middle of orbits. This posterior border extends from tympanum to tympanum, and is not emarginate. Frontal region very broad, concave; muzzle oblique in profile. Canthus rostralis much within maxillary border, well marked, slightly concave, angle of convergence nearly right, with a weak descending ridge nearer orbit than nares. Eyes not very prominent, twice extent of tympanum, which equals discs of anterior digits. Loreal region concave. Vomerine series not short, transverse; inner nares not much larger than ostia pharyngea. Tongue very broad, slightly emarginate. Anterior digits scarcely palmate. Heel reaching beyond end of muzzle; tibia measures a little more than twice from nostril to posterior border of casque. Skin of upper surfaces very sparsely tuberculous.

Length in a ♀, from end of muzzle to posterior border of casque, 2″ 5‴. Least breadth of frontal region 1″ 2‴. Length from posterior border of casque to vent 5″ 7‴; of anterior extremity 5″ 5‴; of posterior extremity 13″ 2‴.

Above purplish brown, beneath yellowish; gular region brown-shaded; sides and interior faces of femur and tibia marbled, and external faces of limbs banded with brown.

Habitat.—District of Guantanamo, Southeastern Cuba. Discovered by Chas. Wright, to whom it is dedicated. Mus. Smithsonian, (No. 5174.)

T. scutigerus *Cope*, sp. nov.

Head more elongate; maxillary outline regularly rounded or slightly truncate. Length from end of muzzle to posterior border of casque less than distance across the mouth opposite middle of orbits. Profile from occiput to muzzle gently arched, the latter not depressed, vertical (truncate) in profile. Canthus rostralis elevated, straight or convex just interior to orbit, converging at an acute angle, without branch-ridge. Loreal region nearly vertical, with a delicate groove between two patches of ossification. Cephalic dermo-ossification with a distinctly-defined cordate outline posteriorly; separable more or less distinctly into two parietals, a pentagonal frontal and two elongate convergent nasal plates; where the latter are in contact with the parietals (on the superciliary margin) there is often an emargination. Eyes not prominent vertically, twice the extent of tympanum. Internal nares very large. Vomerine teeth in two short, widely-separated, straight or slightly curved series, which converge anteriorly between the posterior margin of nares. Tongue scarcely emarginate. Anterior digits one-fourth to one-third webbed. Heel scarcely reaching beyond orbit. Skin very sparsely tuberculous or smooth.

Dimensions of a female.—From end of muzzle to posterior border of casque 2″ 4‴; least width of frontal region 1″ 5‴; greatest width of casque posteriorly 2″; from casque to vent 5″ 8‴; anterior extremity 4″ 6‴; posterior extremity 10″ 8‴. Length of head and body of a ♂ 5″ 6‴.

In spirits, brown; a blackish band or spot behind tympanum, one across casque behind interorbital space, one on anterior dorsal, and some transverse blackish lines on scapular region. Extremital bands with pale borders; sides brown-spotted; a large brown, pale-bordered anal spot.

Habitat.—Jamaica, Prof. C. B. Adams. Mus. Smithsonian, (6268.) Academy Nat. Sciences.

T. lichenatus *Gosse.*

Head short, broadly rounded in outline; length from end of muzzle to most distant point of posterior margin of casque much less than breadth of mouth at middle of orbits; about equal to distance from one supratympanic ridge to the other. Frontal region very concave; profile of muzzle nearly vertical. Canthus rostralis short, very concave, forming a sharp elevated ridge posteriorly, with a short descending branch nearer the orbit; almost obsolete near the external nares; shorter than interorbital breadth. Casque with an elevated, crenulate, doubly-convex posterior margin; rugose, especially upon the superciliary region. Eyes very large and prominent, three times the extent of the tympanum; the latter is obliquely elliptic, contracted antero-superiorly, and bounded above by a crenulate arched ridge. Tongue broad, not emarginate. Vomerine teeth in two short, curved, well-separated series, between the posterior parts of the very large internal nares. Ostia pharyngea relatively small. Exterior anterior digits one-third palmate; palettes as large as tympanum. Heel reaching anterior border of orbit. Skin of upper surfaces roughly, medially sparsely, tuberculous; some prominent elevations near vent, two on the heel, and several on the tarsus and antebrachium.

Dimensions of ♂.—Length from end of muzzle to posterior border of casque 3″; from latter point to vent 7″ 4‴; breadth of interorbital space 1″ 7‴; length of anterior extremity 6″ 2‴; of posterior, 14″ 4‴.

Color in spirits yellowish brown, with deep brown variations, most distinctly on the occipital, interscapular and the superior lateral regions; sides and gular region coarsely brown-spotted. Extremities, including tarsus and foot, cross-banded. Under surfaces yellowish.

Habitat.—Jamaica, Gosse, Adams. Mus. Smithsonian; Amherst, Mass.

Mr. Gosse has given an interesting account of this very singular tree-frog in his "Naturalist's Sojourn in Jamaica,"—a work which is ever recurred to with pleasure. He has also described the colors as they appear during life, which are brilliant: they scarcely assist the student in separating the species when rendered unnatural by preservation in alcohol.

T. anochlorus *Gosse.*

Head elongate, maxillary outlines more accuminate than in the preceding species. Length from end of muzzle to most distant point of posterior margin of casque equal to or greater than distance from alveolar ridge to ridge at middle of orbits, greater than distance from one supratympanic ridge to the other. Frontal region very concave; profile of muzzle vertical. Canthus rostralis as long as interorbital breadth; it forms an acute elevated ridge, which has its median portion nearly transverse, and making nearly right angles with the anterior and posterior portions. Posterior outline of casque much elevated, cordiform, with radiating ridges. A supratympanic serrate ridge. Eyes less prominent, twice the extent of the oval tympanum. Internal nares very large; vomerine teeth in short convex series between them. Tongue a little broader than long, entire. External anterior digits nearly half-webbed. Heel extending to anterior margin of orbit. Skin of upper surfaces sparsely tuberculous, promi-

nent tubercles on antebrachium, heel and tarsus. Abdominal areolations rigid, prominent.

Dimensions of a ♂.—From end of muzzle to convexity of posterior border of casque 2″ 9‴. Breadth of frontal region 1″ 4‴. Length from casque to vent 6″ 5‴; of anterior extremity 5″; of posterior do. 12″ 7‴.

Color in spirits, above uniform olivaceous; lateral and internal femoral regions marbled; extremities above banded with brown; mandibular region delicately brown-marbled. A dark anal spot.

Habitat.—Jamaica. Drs. Gosse, Betton, Adams. Mus. Academy Natural Sciences; Amherst College, Mass.

It is altogether probable that this is the species described by Mr. Gosse, in his work previously mentioned, under the name adopted. His description, relating principally to coloration, is not conclusive towards any identification.

Its affinities are altogether with the lichenatus, both being peculiar in the elevation of the posterior margin of the casque into a transverse crest. It differs in the greater elevation of this crest, the more elongate proportions of the cranium, the angulation of the canthus rostralis and less prominence of eyes, besides minor points.

Hyla Laur.

Hyla miotympanum *Cope*, sp. nov.

Skin of superior surfaces smooth; gular region areolate; a gular and antepectoral fold, also one across the axilla; another running from inferior anterior face of thigh obliquely upwards to the iliac region. A fold across extremity of forearm, above carpus. Outer fingers one-fourth, toes extensively, webbed; palettes larger than tympanum; posterior extremities slender; the heel reaches the end of the muzzle. Muzzle broadly rounded; canthus rostralis short, loreal region oblique. Nostrils vertical. Eyes very prominent, six times the extent of the small tympanum. Tongue slightly emarginate. Vomerine teeth in two elongate fasciculi between internal nares, presenting an obtuse angle posteriorly.

Length from muzzle to upper border of tympanum 1‴; breadth of jaws opposite middle of orbit 1‴. Length from tympanum to vent 2″ 3‴; of anterior extremity 1″ 9‴; of posterior extremity 5″ 1‴.

In spirits, above purplish ash, (probably green in life,) with or without a few lighter specks, and indistinct darker reticulations. Extremities paler, not barred; a light border from heel to digits, another bounding superiorly a subanal spot. Under surfaces yellowish; superior labial border and lateral stripe bright yellow, the latter sometimes not well separated from the abdominal shade.

Habitat.—Near Jalapa, Mexico. Obtained by Sr. R. Montes de Oca. Mus. Smithsonian, (No. 6311,) Mirador, Dr. Sartorius.

A species to be compared with rhodopepla *Gthr.*, rubicundula *R.* and *L.*, luteola *Burm.*, molitor *Schm.*, but differing from all in the minuteness of its tympanum. In viridis the tympanum is larger, the head is more elongate and the hands less palmate, besides the presence of a yellow band on the tibia.

Hyla palliata *Cope*, sp. nov.

All the digits of posterior extremity palmate to penultimate phalanx; of the anterior the three external are one-third webbed. Metacarpus of inner digit with a large tubercle. Tympanic disc one-sixth the size of the eye. Vomerine teeth in a short uninterrupted series behind posterior margin of internal nares. Tongue oval, nicked. Muzzle prominent, truncate; loreal region not concave. From nostril to orbit equal diameter of orbit, and is less than the width of the interorbital space. One vocal sac. Skin smooth above, not granulated on the gular region. The end of the tibia reaches middle of orbit when the limb is extended.

Length of head and body 19‴; of anterior extremities 10‴; of posterior 25‴.

Extremities, lower surfaces, loreal and labial regions grayish-brown; upper surface of head and body pale ochreous, abruptly separated from the other color all round.

Habitat.—Paraguay. From Capt. Page's Expedition. Mus. Smithsonian, (No. 6225;) Academy Natural Sciences.

Hyla baudinii *Dum. Bibr.*, Erp. Gén., viii. 564, 1841.

The names *Hyla vanvlietii*, published in these "Proceedings" for 1854, p. 61, and *H. muricolor*, 1862, 359, apply to forms of this species. It is found in Texas, Eastern Mexico and Honduras. Mus. Academy, Phila.; Smithsonian.

Hyla (Hypsiboas) oxyrhina *Rhdt. et Lütk.*, Videnskab. Meddelelser, etc. Kjobenhavn, 1862, p. 189.

This species is identical with that described in these "Proceedings," 1862, p. 353, as *Hypsiboas raniceps*. The name of the distinguished Danish zoologist must be retained, as the memoir in which it appeared was issued some months prior to our own. The former has just come into our hands.

Hylodes Fitz.

Hylodes planirostris *Cope*, Pr. A. N. S. Philada., 1862, p. 153.

This species, hitherto known as a native of the Bahama Islands, has been sent to the Mus. Smithsonian (No. 6310) from Southern Florida by Dr. Cooper. It is the only species of the genus found in the United States, though Holbrook and Agassiz have described frogs under this name from our country. These belong to the genera Acris, Hyla and Pseudacris. Other reptiles common to the Bahamas and Florida are Anolis principalis and Sphærodactylus notatus.

The following species of Hylodes form a little group which I have called Craugastor,—Proc. A. N. S., 1862, p. 153. They can be distinguished as follows:

H. pulchrigulus, l. c., 1862, 357.

Tympanum one-fourth extent of orbit; the latter equal distance from its anterior border to end of muzzle. Carpus reaching anterior border of orbit. Muzzle truncate. Tongue emarginate. Loreal region concave. End of tibia reaching the end of the muzzle.

H. griseus.

Hyla grisea, Hallow., Pr. A. N. S. Phila., 1860, p. 485.

Tympanum obliquely elliptic, one-third the extent of the orbit; diameter of the latter less than the length of the rather elongate and rounded muzzle. Carpus and end of tibia reaching the end of the muzzle. Loreal region concave; canthus rostralis strong. Tongue emarginate; external metatarsal tubercle not developed.

H. hallowelli *Cope*, l. c., 1862, 153.

Tympanum horizontally elliptic, equal one-third extent of orbit; latter equal in diameter to length of muzzle, which is much rounded; loreal region nearly plane; canthus rostralis weak. Carpus reaches end of muzzle, the tarsus only the orbit. Two well developed metatarsal tubercles. Tongue entire; mandibulum rounded.

Herr Schmidt has not given the minuter peculiarities of his H. (Craug.) fitzingerii so as to enable us to distinguish it from the above. It is most like the pulchrigulus.

Phyllobates Bibr.

Phyllobates latinasus *Cope*, sp. nov.

Head elongate; front plane transversely, gently arched longitudinally, a little wider than from orbit to end of muzzle. The latter is prominent, broad and concavely truncate; external nares lateral. Loreal regions plane. Internal

[Mar.

nares widely separated. Tympanum round, equal one-fourth extent of orbit, whose diameter equals length of muzzle from orbit. A slight web between outer fingers, of which the second is shorter than the inner or first; one large carpal tubercle, one on metacarpus of thumb. A dermal fold on the tarsus. Two metatarsal tubercles. The carpus reaches the end of the muzzle, and the heel the anterior border of the orbit. Length of head and body 3″.

Above brown; a black band across end of muzzle and loreal region, through eye to groin; pale-bordered above on the muzzle, and interrupted by an oblique white line from the femur. Femur dark posteriorly, tibia cross-banded; (color of limbs not well preserved.) Beneath pale, immaculate.

Habitat.—Truando region, New Granada. Obtained by Arthur Schott, Esq., of the U. S. Expedition under Lieut. Michler.

Hylaplesia Boie.

Hylaplesia t r u n c a t a.

Phyllobates truncatus Cope, Pr. A. N. S. Philada., 1860, p. 372.

A certain serrulation of the alveolar ridge of the maxillary bone, in this and the following species, greatly resembles dentition, and has caused their erroneous reference to Phyllobates, instead of Hylaplesia.

This animal is most like the H. o b s c u r u s *e Dum., Bibr.*, but has much shorter posterior extremities. In both the anterior extremities equal the head and body; in the former they are more than half the length of the posterior, in the latter, considerably less than half. In the t r u n c a t u s the first and second fingers are equal; their expansions are one-fourth the size of the tympanum. The neural spines are very much dilated and thickened, especially that of the axis. There is a transverse bony ridge on the occiput.

Hylaplesia a u r a t a.

Phyllobates auratus Girard, U. S. Astronomical Expedition, ii. p. 209.

In this species the muzzle is rounded, and the first finger shorter than the second, as in the H. t i n c t o r i a. It has no occipital ridge, and the neural spines are only slightly thickened. Dilatations of posterior extremities one-fourth extent of tympanum; of anterior, one-half the same. The ground color is black or brown. Crown and muzzle surrounded by a golden band; two postscapular transverse annuli on each side, in contact on the median line; a yellow annulus on each inguinal region; smaller rings on humerus and tibia. On pale specimens these markings are represented by refulgent bands which are readily destroyed or passed over; hence the imperfections of Girard's description.

BUFONIDÆ.

Rhæbo h a e m a t i t i c u s *Cope*, Pr. A. N. S., 1862, p. 357.

The genus Rhæbo is to be distinguished from Bufo by the presence of the manubrium sterni, in addition to the characters given, l. c., p. 358. I have had opportunity of observing it in the present species and the R. l e s c h e n a u l t i i. This character has been denied to all Bufones in Stannius' "Handbuch der Zootomie." I find it also in "Bufo s i m u s *Schm.*," l. c., p. 357, which can hardly be placed in Rhæbo. I cannot assign it to a new genus until the value of its peculiarities is better known.

The genus of Bufonidæ for which I have adopted, in the above quoted article, Fitzinger's name Chilophryne, is not alone characterized by the presence of a parietal branch or continuation of the supraorbital ridge, as there indicated; but rather by the straightness of the latter, its not describing the usual arc of the orbit, and its angle with the postorbital ridge, when the latter is present. The parietal ridge sometimes exists in a rudimentary or fully developed condition in Phrynoïdis. P. s t e r n o s i g n a t u s *e Gthr.*, illustrates the first case, and P. d' o r b i g n y i the last. As the latter species is the type of *Chilophryne*

Fitz., this name must become a synonyme of Phrynoïdis, and the genus to which I first applied it he called Incilius. The species which truly belong to it are I. lentiginosus, cognatus, woodhousei, americanus, nebulifer, veraguensis, coniferus, dialophus, and probably biporcatus. The species d'orbignyi, celebensis and occellata formerly referred to it, must be placed in Phrynoïdis *Fitz.*

Bufo diptychus *Cope*, l. c., 353, is the species described by Dr. Girard, as B. poeppigii *Tsch.*, in Herpetology of U. S. Exploring Expedition. It is distinct from Tschudi's toad.

CERATOPHRYDIDÆ.

This family has been recognised in an indefinite way by Dr. Tschudi,* who gives as its distinguishing features "kopf sehr gross, eckig, schief nach vorn verlängert; Hautverlängerungen am obern Augenliede." He includes in it the genera Ceratophrys, Phrynocerus, Megalophrys and Asterophrys. The unnatural nature of this union has been demonstrated by Dr. Günther, who places Asterophrys and Megalophrys in separate families, and assigns Ceratophrys with Phrynocerus to the Ranidæ. The Ranidæ of Günther is, however, a heterogeneous group; and I would separate under Tschudi's name those genera of toad-like animals in which the manubrium sterni is wanting. These are Ceratophrys, Phrynocerus and Pyxicephalus;† probably Calyptocephalus will enter the same series; but these I have not seen. Tschudi's inapplicable characters may be replaced by the following. *Form stout, bufonine; head broad, elevated. Os maxillare toothed. Extremities short; digits without terminal discs; the posterior more or less webbed. Ear perfectly developed. Diapophysis of sacral vertebra cylindrical. Manubrium sterni wanting. Paratoids present or absent.* I am not now acquainted with other peculiarities, though they doubtless exist.

The System of Opisthogloss Anura proposed by Günther, like the system of Ophidia of the Erpétologie Générale, is a valuable index of the subject, but not an exposition of the scheme of nature. I have already‡ ventured the opinion that a primary division into forms with, and forms without dilatations upon the extremities of the digits cannot be maintained: this character must be subordinated, as that of the presence or absence of teeth on the maxillary bones as employed by Duméril and Bibron, has been by Günther himself. He attaches greater value to the former because it "is connected with a strongly-marked distinction in the mode of life." This appeal to adaptations is not uncommon; but we now know enough of the system, to believe that the relations of its parts are to be determined by homological and embryological considerations combined, which coincide also with chronological and geographical. Have we not creatures of similar habits and adaptations in the most diverse groups? It is enough to mention to a herpetologist the arboreal Viperidæ and Crotalidæ; the corresponding types of Pleodonta and Cœlodonta, of Acrodonta and Pleurodonta; the gill-bearing Siredon and Siren, and a host of other such; the parallelisms of the Implacental and Placental Mammalia, etc. Also the supposed Neotropical Shrikes and Certhiidæ are Clamatores, and the supposed Salmonidæ are Characins. In comparing many of these cases, we observe, too, how by approximation in time, analogy becomes affinity.

In pursuance of this view, the probability of a distinction between the Hylodidæ and Cystignathidæ of Günther has appeared to the author to vanish in great measure. The discovery of the genus Tarsopterus of Reinhardt and Lütken, in connection with that of Plectromantis, by Wagner, has confirmed this opinion. The two genera are incontestably nearly allied, as urged by Reinhardt,‖ though the

* Classif. der Batrachier, 26.

† Stannius' statement, "Zootomie der Amphibien," p. 17, that Pyxicephalus possesses the manubrium, relates properly to the species now called Tomopterna, which were formerly included under that genus.

‡ Proc. Acad. Philada., 1862. p. 351.

‖ Videnskab. Meddelelser Kjobenhavn, 1862, p. 240.

latter only has paratoid glands. Their margined toes are but a step beyond those of certain Cystignathi; their digital dilatations are as distinct as those of many Hylodidæ. The family of Cystignathidæ, thus composed, would contain the types Platyplectrum *Gthr.*, Limnodynastes *Fitz.*, Cystignathus *Wagl.*, Pleurodema *Tsch.*, ?Gomphobates *R.* and *L.*, Ischnocnema *R.* and *L.*, Liuperus *D.* and *B.*, Tarsopterus *R.* & *L.*, Plectromantis *Peters*, Crossodactylus *Dum.*, *Bibr.*, Phyllobates *Bibron*, Hylodes *Fitz.*, (or the genera into which the last may be divided.) In this association the paratoids of Plectromantis have but little weight, as in Pyxicephalus in our Ceratophrydidæ; and it is probable that it will again be found that their presence or absence is immaterial in the definition of certain families in the Anura, although others may be well characterized by them, as in Günther's method. The genera Pelodryas *Gthr.*, and Scytopis *Cope*, with large paratoids will probably be referred to the Hylidæ, which has been defined as destitute of them.

Pyxicephalus cultripes.

Odontophrynus cultripes Rhdt. and Lütk., Videnskab. Meddelelser, etc., Kjobenhavn, 1862, p. 159.

If we introduce the presumed genus Odontophrynus into Duméril and Bibron's table of genera of Raniformia, the only character which seems to separate it from Pyxicephalus is the concealed tympanum of the former, as distinguished from its visibility in the latter. This character is sometimes of very little value, the tympanic disc being more or less distinct in different individuals of the same species of many Anura, in proportion to the tenuity of the epidermis. This is especially seen in species of Bufo. The text relating to Pyxicephalus americanus, however, settles all doubts, as it says, "Tympan imperceptible au travers de la peau." In their Latin diagnosis, Reinhardt and Lütken say "dentes** non in palato;" but in the text, "To langagtige i midten ikke sammenstödende Tandgrupper ere stillede paa Ganen mellem de indre Næsebor," etc. As the figure represents palatine teeth, they are doubtless present. The species cannot, therefore, be separated from Pyxicephalus. It is very nearly allied to, if not identical with, the frog called Pyxicephalus? n. sp., in the recently-published Catalogue of the collection brought home by the United States Paraguay Expedition.*

ALYTIDÆ.

Scaphiopus.

The species of this genus are seven in number; they are found throughout the temperate regions of North America, and as far southward as the City of Mexico. They represent the single Alytes obstetricans of Europe, which differs in its want of manubrium sterni, its slightly-webbed toes, and its cuneiform bone forming but a tubercle; and the Helioporus albipunctatus of Australia, where there is a spur upon the thumb, and trihedral diapophysis of sacral vertebra. They may be at once separated by means of the following synopsis:

I. A gland in the upper integument of tibia.

Head short; tympanum concealed..... multiplicatus.

II. No gland in upper integument of tibia.

a. No pectoral glands.

β. Length of tibia three times frontal breadth.

Muzzle depressed, prominent.

Tympanum concealed..... couchii.

Muzzle elevated, truncate in profile.

Front plane;

Loreal region covex, oblique..... varius.

* Proc. A. N. S., Phil., 1862, 352.

Loreal region straight, nearly vertical..... r e c t i f r e n i s.
Front swollen..... b o m b i f r o n s.
ββ. Length of tibia four times frontal breadth.
Muzzle truncate in profile..... h a m m o n d i i.
αα. A gland on each side of thorax, near axilla.
Tympanum one-half the extent of the eye..... h o l b r o o k i i.

S. m u l t i p l i c a t u s *Cope*, sp nov.

Form broad, squat. Head very short; profile rapidly descending; maxillary outlines acuminate, oval; muzzle thick, rounded. Eyes very prominent. From these a strong fold passes posterior to the angle of the mouth and across the gular region; tympanum covered by a portion of the paratoid gland anterior to this. Paratoid proper very large, extending beyond scapula, bent upon the side; bounded inferiorly by a strong fold, which extends from the one above mentioned to the groin. Below this, on the sides, are two or more others. Skin of upper surfaces coarsely tuberculous, that of the crown thick, of the extremities nearly smooth. A large gland occupies most of length of tibia. Abdomen minutely, pubic region coarsely, rugose. Cuneiform process rather short, very prominent. Vomerine teeth in fasciculi opposite posterior margins of choanæ; the latter smaller than ostia pharyngea. Tongue entire, with a narrow, free anterior border; on third free posteriorly.

Dimensions of a ♀.—From end of muzzle to vent 5″ 1‴; muzzle to behind tympanum 16‴; length of anterior extremity 2″ 6‴; of posterior extremity 5″ 4‴.

Color in spirits: above ashy-brown, below yellowish-ash.

Habitat.—Valley of Mexico. Sent by Mr. Jno. Potts to the Mus. Smithsonian, (No. 3694.)

This species is very bufonine in aspect, and might be regarded as representing a different genus from the type of h o l b r o o k i i were it not for the existence of c o u c h i i and b o m b i f r o n s.

S. c o u c h i i *Baird*, Proc. A. N. S., Phila., 1854, p. 62. Rept. U. S. and Mex. Bound. Surv., Reptiles, p. 28, pl. XXXV. figs. 1–6.

Form stout; head more elongate, acuminate oval; width of frontal region greater than from lip to nares, one-third the length of the tibia. Profile gradually descending; front plane, muzzle projecting, rounded. Anterior border of tympanum scarcely distinguishable. Eyes very prominent. Vomerine teeth opposite middle of choanæ, which equal ostia pharyngea. Tongue slightly emarginate. Paratoid gland flat, descending on the side. Skin tuberculous, especially on the sides; sometimes a slight cryptiferous thickening of integument of tibia; none on the sides of the pectoral region. A posttympanic and an antepectoral fold. Abdomen slightly rugose; gular region smooth. Cuneiform process elongate. Toes fully palmate.

Dimensions of a ♂.—From end of muzzle to vent 5″ 5‴; from same to behind tympanum 2″. Anterior extremity 3″ 5‴; posterior extremity 5″ 6‴.

Color above yellowish, with irregular brown bands, which converge between and behind the orbits; others diverge on the flanks, beginning at the orbits; one from same point to lip, and one on canthus rostralis. There is a confluence of dorsal bands near the sacrum. A light band on outer face of tarsus and toe; hand yellowish.

Habitat.—Tamaulipas. Mus. Smithsonian, (3713.) Lieut. Couch.

S. v a r i n s *Cope*, sp. nov.

Outline of muzzle acuminate-oval; the end little depressed, nearly vertical in profile, distance from lip to nostril less than frontal breadth; the latter one-third tibia. Canthus rostralis obsolete, approximate; loreal region convex, very oblique in transverse section. Eyes prominent. Tympanum concealed or distinct, one-third extent of eye. Vomerine teeth opposite posterior border

of choanæ. Skin rather smooth, especially on the head. No posttympanic or antepectoral fold. No thoracic aggregation of cryptæ; paratoids flat, small. Palmation of posterior digits extensive; cuneiform process prolonged longitudinally.

Dimensions.—Total length 5″ 3‴; from end of muzzle to behind tympanum 19‴; of anterior extremity 3″; of posterior 5″ 9‴.

Above yellowish olive, with numerous defined brown bands and spots, which have a general longitudinal direction, and cover more surface than the ground color. A spot across each eyelid, one beneath the eye, one on the end of the muzzle. Extremities marbled; beneath olivaceous yellow.

Habitat.—Cape St. Lucas, Lower California. Mus. Smithsonian, (No. 5893;) Philada. Academy. From John Xantus, Esq.

S. rectifrenis *Cope*, sp. nov.

Outline of maxillæ acuminate-oval; muzzle prominent, truncate in profile, superior face decurved. Canthus rostralis strong; loreal region plane, nearly vertical. Frontal region plane, its width one-third the length of the tibia. Tympanum concealed. Vomerine fasciculi closely approximate, posterior to hinder margin of choanæ. Skin of head and body sparsely tuberculous. A weak antepectoral fold. Paratoids rather lateral; no thoracic cryptæ.

Dimensions.—From muzzle to vent 2″ 8‴; from muzzle to brachium 14‴; length of anterior extremity 15‴; of posterior 3″.

Coloration.—Above brown, or brownish-gray, the tubercles tipped with brown. A brown line extends from each eye to sacrum, converging posteriorly. Sides brown marbled posteriorly; a short brown band from tympanum. Below light yellow or brownish.

Habitat.—Tamaulipas, (Smithsonian, No. 3715.) Coahuila, (3714.)

S. bombifrons *Cope*, sp. nov.

Outline of maxillæ acuminate-oval; muzzle truncate, elevated, thickened transversely; profile of vertex arched, of front concave; canthus rostralis replaced by a concavity. Tympanum concealed or scarcely visible; paratoid flat, small. No gland on tibia or pectus. Tongue entire. Vomerine teeth in oblique fasciculi or short series between choanæ; these equal ostia pharyngea. Skin nearly smooth, roughest on the sides. Cuneiform process produced. Palmation of toes deeply repand.

Dimensions of a ♂.—From end of muzzle to vent 4″ 2‴; same to behind tympanum 1″ 5‴; length of anterior extremity 19‴; of posterior 4″ 6‴.

Color in spirits: pale ashen or brown, with numerous plumbeous vermiculations, which are aggregated into a blotch on the scapular region, which has a pale space below it. Limbs vermiculated; outer border of tarsus and foot light. A dark spot on canthus rostralis.

Habitat.—Fort Union, on Missouri River, lat. 48° N., from Mr. E. J. Denis, (Smithsonian, No. 3704.) On Platte River, 200 miles west of Fort Kearney, from W. S. Wood, of Lieut. Bryan's Expedition, (Smithsonian, No. 3520.) Llano Estecado Texas, Capt. Pope's Exped. Coll., (Smithsonian, No. 3703.)

This species has the most northern range of those found west of the Mississippi.

S. hammondii *Baird*, Report Surv. for Pac. R. R., v. x. Lieut. Abbot's Rep., pt. iv., p. 12, pl. XXVIII. f. 2.

Maxillary outline acuminate-oval; muzzle somewhat truncate, perpendicular in profile. Region of canthus rostralis concave; front plane or a little concave, with a weak ridge on each side, which is most distinct posteriorly; the width one-fourth length of tibia, and less than from nostril to lip. Eyes prominent; tympanum distinct, one-fourth the extent of the former. A fold behind angle of mouth. Paratoids flat, small; no gland on tibia or pectus. Tongue very large, entire. Choanæ large; vomerine teeth in transverse series between them. Skin roughly tuberculous, especially on the sides; thick on the occiput; below nearly smooth. Cuneiform process produced.

Dimensions of ♂.—Length from end of muzzle to vent 4″ 9‴; from muzzle to behind tympanum 1″ 8‴; of anterior extremity 2″ 9‴; of posterior 6″ 1‴.

Color above stone brown in alcohol, with traces of two paler dorsal bands. Tubercles fulvous-tipped; extremities shaded with the same. Below whitish, immaculate.

Habitat.—California. Mus. Smithsonian, 3695. From Fort Reading, lat. 40° 20′.

S. holbrookii *Baird*, Rept. Surv. Pac. R. R., v. x. Lieut. Abbot's Rep., pt. iv., p. 12, pl. XXVIII. f. 1.

Rana holbrookii Harl., Med. and Phys Res., 1835, p. 105.

Scaphiopus solitarius Holb., N. Am. Herp., 1836, vol. i., p. 85. pl. XII. Ibid (edit. alt.) 1842, iv. 109. pl. XXVII. Tschudi, Mém. Neuchatel, i., 1838, p. 83. Dum., Bibr., Erp. Gén., 1841, viii., 473. Le Conte, Pr. A. N. S. Phil., 1855, 429. Günth., Catal. Batr. Sal. Brit. Mus., 1858, p. 38.

Head large, maxillary outline rounded. Profile of front a rather steep descent from the swollen occiput, where the skin is thin, closely adherent and penetrated by osseous granules. Eyes prominent; tympanum distinct, half its extent vertically elliptic. Tongue large, elongate, emarginate. Choanæ equal or larger than ostia pharyngea; vomerine teeth in two fasciculi between and opposite their posterior borders. Paratoids small, rounded, prominent; no gland on the tibia; one on each side of the thorax near the axilla. Skin of back minutely tuberculous; of sides more coarsely; below nearly smooth. Cuneiform process longer than in any other species of the genus, but not more prominent.

Dimensions of ♂.—5″ 8‴ from end of muzzle to vent; from same to posterior border of tympanum 2″ 2‴; length of anterior extremity 3″ 3‴; of posterior 12″ 5‴.

Color above, in spirits, either earth-brown, fulvous-brown or ashy-brown, with a pale ashy band from each orbit; these converge on the interscapular region, then diverge, and converge again on the coccyx. These bands are rarely unbroken, and are sometimes exceedingly indistinct; they sometimes inclose a pale area. Sides sometimes marbled with pale ash, sometimes uniform. Sometimes a pale interorbital crossband, sometimes two longitudinal bands on muzzle. A vertical light line on end of muzzle.

Habitat.—From Massachusetts into Florida and Mississippi.

Specimens in Mus. Smithsonian from Cambridge, Mass., are nearly unicolor, while Floridan forms are lightest and most variegated; the head seems to be a little broader and more obtuse. These forms graduate into the intermediate and most common type.

AMBLYSTOMIDÆ.

Spelerpes chiropterus *Cope*, sp. nov.

Head elongate oval; muzzle prominent, truncate, as broad as length of antebrachium. Series of palatine teeth arched, commencing behind the choanæ. Anterior limb extended forward, reaches orbit. A prominent wing-like rudiment only of the inner digit on both pairs of extremities. Thirteen lateral folds between axilla and groin; the extended posterior limb reaches the sixth, counting from the groin. Soles broad, smooth. Tail cylindrical, rapidly tapering, one-fifth longer than head and body.

Length from muzzle to vent 3″ 1‴; from muzzle to axilla 12‴; length of tail 4″.

Color, brown above, paler medially; dirty white below.

Habitat.—Mirador, near Vera Cruz, Mexico. Sent by Dr. Sartorius to the Smithsonian Institution.

This is the third species of Salamander known to inhabit Mexico. In its characters it approaches the genus Batrachoseps *Bonap.* One of Dr. Sartorius' most interesting discoveries.

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Enumeration of the Species of PLANTS collected by Dr. C. C. Parry, and Messrs. Elihu Hall and J. P. Harbour, during the Summer and Autumn of 1862, on and near the Rocky Mountains, in Colorado Territory, lat. 39°—41°.

BY ASA GRAY.

An interesting account by Dr. Parry of his first explorations of the Rocky Mountains in Colorado Territory, made in the summer of 1861, was published in the American Journal of Science and Arts, vol. 33, 1862. This was followed by an enumeration of the plants in the choice botanical collection which he made, as determined by myself, Dr. Engelmann and others. The importance of this pioneer exploration, both in a physico-geographical and a botanical point of view, decided Dr. Parry to repeat and extend it the following year, to undertake more full and exact observations upon the configuration of the district, and the altitude of the loftier peaks, and to secure a larger botanical collection. In the latter view, Dr. Parry was joined by two zealous and enterprising botanical companions, Messrs. Hall and Harbour, of Illinois, who devoted their entire energies to the collection of plants. The botanical collection, accordingly, through these conjoint labors and explorations, is full, excellent, and of great interest. Along with a fair proportion of species new to science or new to the region, it brings to light and makes accessible to botanists generally, many of the late Mr. Nuttall's discoveries made almost thirty years ago, and even some of those of his first journey up the Missouri, almost half a century ago, authentic specimens of which hardly exist, except in the herbarium of the Academy, in that of Mr. Durand, at Philadelphia, and in the Hookerian herbarium at Kew.

It is in this regard, namely, on account of the intimate association of the name and scientific career of Nuttall with Philadelphia, and especially with the Academy of Natural Sciences,—the publisher of many of his botanical writings, and the proprietor of his principal botanical collections,—that I have deemed it peculiarly proper to offer the following enumeration for publication in the Academy's Proceedings.

This enumeration is but a *reconnoisance* of the collection in hand. It might have been much extended by descriptions, remarks, and refereuces; and some of the determinations may probably have to be reconsidered. But I deem it best for our science to publish it at once, as it is, that it may be early in the hands of botanists along with the distributed sets of specimens, thus enhancing the usefulness of the collection, and affording the widest opportunity for the prompt correction of oversights, omissions, or mistakes on my part, of which there may be not a few.

It should be remarked that the general collection, although made by the three associates conjointly, is distributed under the tickets of Messrs. Hall and Harbour,—upon whom indeed the labor of the collection more immediately devolved,—and is numbered quite independently of Dr. Parry's collection of 1861, thus avoiding all danger of confusion between the two. But a small separate collection made by Dr. Parry late in the summer, at stations visited by himself alone, which supplements or helps out the general collection, bears Dr. Parry's numbers of the former year, (which, being already published, are here mentioned only when there is some occasion for it,) or, when of plants not in that collection, the numbers are in continuation of it,—viz.: 398, 399, and so on. Reference to these additional numbers is chiefly made in foot-notes, to which also the characters of new species, &c., are consigned.

The plants were numbered and distributed into sets by Messrs. Hall and Harbour before they were seen by me, and a full set was supplied to me for examination, which serves as a basis for the following list. This accounts for a few misplacements, and also for the occasional mixture of two species

under the same number; which, under the circumstances, it was not easy altogether to avoid. The collectors appear to have been somewhat too fearful of distributing the same species under two or more numbers; but the opposite course, in case of doubt, is preferable. Even well-marked varieties had better be kept separate in distributed collections.

ENUMERATION.

RANUNCULACEÆ.

1. ATRAGENE ALPINA, L. 2. CLEMATIS DOUGLASII, Hook. 3. C. LIGUSTICIFOLIA, Nutt. 4. PULSATILLA NUTTALLIANA, Gray, which I am now convinced is properly referred to *P. patens*, and especially by Regel to his var. *Wolfgangiana*. Some of the specimens are very large and fine. 5. ANEMONE MULTIFIDA, DC., both red and white-flowered. 6. A. CAROLINIANA, Walt.; on the plains. 7. A. NARCISSIFLORA, L., from the alpine region; not before known this side of Russian America; fine specimens, with the flowers only three, two, or one to the involucre. 8. THALICTRUM FENDLERI, Engelm.; the diagnosis noted in the Enum. Pl. Parry, p. 12, and now the species itself is obtained, "on low mountains." 9. T. SPARSIFLORUM, Turcz.,* in fruit, "the whole plant with a very heavy narcotic odor," according to Dr. Parry. 10. T. ALPINUM, L., large specimens. 11. RANUNCULUS CYMBALARIA, Pursh. 12. R. HYPERBOREUS, Rottb. var. *natans*, C. A. Mey. "In water or in swamps, at middle elevations in the mountains, or subalpine;" from the station and from the size of the plants so much approaching the small and emersed form of *R. Purshii* var. *repens*, Hook., (*R. Gmelini*, DC., of which a few specimens were also collected,) that it might belong to that species except for the want of a style; mature fruit not collected. 13. R. (CYRTORRHYNCHA) NUTTALLII, the very rare *Cyrtorrhyncha ranunculina*, Nutt. in Torr. and Gray Fl., which is rightly determined by Bentham and Hooker to have the ovule erect, and therefore to be a Ranunculus, notwithstanding the nervose achenia.† 14. R. ESCHSCHOLTZII, Schlecht., Hook.; same as the broader-leaved specimens of Parry's No. 80; has glabrous peduncles, smaller flowers, and shorter styles than *R. nivalis*, but Greenland specimens of Vahl's collection approach it. 15. R. AFFINIS, R. Br. var. *leiocarpus*, Trautv.: the same as narrow-leaved specimens mixed last year with Dr. Parry's No. 80 (vide Sill. Jour., 33, p. 404); may be a form of *R. auricomus* if that ever has glabrous achenia, but they compose a rather oblong or cylindraceous head. 16. R. AFFINIS, var. *cardiophyllus*. (*R. cardiophyllus*, Hook.) The flowering specimens, with their cordate-rotund radical leaves, villous pubescence and large flowers (the corolla a full inch in diameter) perfectly accord with Hooker's figure, except that the stature is dwarf, and the young carpels show a rather long style, as figured; but accompanying fruiting specimens wholly accord with *R. affinis*. 17. R. ADONEUS, n. sp.,‡ No. 81, of last year's collection of Dr. Parry, who has now supplied the fruit; and the species proves to be a new and peculiar, handsome and strictly alpine one.§ 18. R. FLAMMULA, L.,

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* Dr. Regel's note under this species, in his elaborate revision of *Thalictrum*, is founded on a misreading of my foot-note in Pl. Wright, 2, p. 8, where to *T. sparsiflorum* is referred *T. clavatum*, Hook., *non* DC. The Candollean species is wholly different, and a native only of the mountains of Carolina.

† RANUNCULUS (CYRTORRHYNCHA: petala supra basim *callosa*: stylus *incurvus*, stigma apiculatum: achenia turgida multinervosa) NUTTALLII: glaber, semipedalis; radice fasciculata; foliis radicalibus biternatisectis, segmentis 3–5-partitis, lobis oblongis linearibusve nunc 2–3-fidis; ramis folio parvo subtensis pauciforis; petalis spathulatis sepala latiora etiam flava paullo superantibus; stylo longo gracili; acheniis majusculis subpaucis in capitulum globosum collectis. Eastern side of the Rocky Mountains; Independence Rock on the Sweet Water of the Platte. Nuttall.

‡ Mixed in some sets, I fear, with a little of *R. Escholtzii* or of the real *R. nivalis*.

§ RANUNCULUS ADONEUS, (sp. nov.,: humilis, villo parco deciduo glabratus; radice fasciculato-fibrosa; caulibus basi ramentaceis superne 1–3-foliatis nunc erectis simplicissimis unifloris nunc sarmentoso-decumbentibus 2–3-floris; foliis bipedato-partitis segmentis anguste linearibus, petiolis basi scarioso-dilatatis; pedunculo brevi; corolla aurea eximia (plerumque ultra pollicem diametro;) petalis flabelliformibus sepalis ovalibus subvillosis duplo longioribus, squamula ba-

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var. *reptans*. 19. R. An ambiguous little plant from the alpine region, which might be mistaken for a smaller form of Parry's 79.* 20. MYOSURUS MINIMUS, L., from South Park, with somewhat more of a beak to the achenia than in Eastern or European specimens. 21. CALTHA LEPTOSEPALA, DC. 22. TROLLIUS LAXUS, Salisb. var. *albiflorus*, Gray, in Sill. Jour. 33; well-developed specimens. Divisions of the leaves less deeply incised than in the Eastern U. S. plant. 23. AQUILEGIA VULGARIS, var. *brevistyla*. 24. A. CŒRULEA, Torr., equally beautiful with the specimens of last year. 25. DELPHINIUM ELATUM, L., var., Parry's No. 84. 26. D. SCOPULORUM, Gray. 27. A high alpine form of the last. 28. D. MENZIESII, DC.; but if collected east of the Mississippi might be taken for *D. tricorne*. 29. ACONITUM NASUTUM, Fisch.; white and blue, as in Parry's 86.

BERBERIDACEÆ.

30. BERBERIS (MAHONIA) AQUIFOLIUM, Pursh, var. *repens*.

FUMARIACEÆ.†

31. CORYDALIS AUREA, Willd., var. CURVISILIQUA (*C. curvisiliqua*, Engelm.), the same as Wright's No. 1309.

CRUCIFERÆ.

32. NASTURTIUM OBTUSUM, Nutt. 33. CARDAMINE HIRSUTA, L. 34. C. CORDIFOLIA, Gray.‡ 35. STREPTANTHUS ANGUSTIFOLIUS, Nutt.; probably a form of S. SAGITTATUS, Nutt. 36. TURRITIS PATULA, Graham. 37. SISYMBRIUM VIRGATUM, Nutt., but from the silique rather an *Erysimum*. 38. ERYSIMUM CHEIRANTHOIDES, L. 39. E. PUMILUM, Nutt., (which I suppose is also *E. lanceolatum*, R. Br., of the Old World,) as to the fruiting alpine specimens, along with forms of E. ASPERUM, DC., with large flowers (*E. Arkansanum*). The collectors think these are all forms of one species. 40. SYSIMBRIUM SOPHIA, L. (including *S. canescens*, Nutt.), both a smoothish form, with short pedicels and short pods, (*S. brachycarpum*, Richards.), and also with slender pods, and the whole herbage viscid with glandular pubescence,—one of the forms of *S. incisum*, Engelm. 41. DRABA CRASSIFOLIA, Graham; which, in Parry's former collection, No. 93, I named *Draba Johannis*, but it proves to have yellow flowers.§ With it is mixed a very little *D. stellata*, var. *hebecarpa*, as the species are

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silari parva adnata; achoniis in capitulum ovale digestis lævibus turgidis, rostro longiusculo ensiformi utrinque scarioso-alato! In the high alpine region, close to the snow. Dr. Parry's specimens of 1862, collected later in the season,—with some mature fruit, and with some of the stems becoming procumbent or runner-like, and producing a flowering shoot from the axils of the cauline leaves,—enable me to characterize this remarkable species. In the early state it bears some resemblance to *Adonis vernalis*. The scarious wings of the style are sometimes decurrent on the achenium, which, again, often has a delicate hyaline wing round the base. Notwithstanding the yellow flowers, the affinity of the species is probably with *R. glacialis*, the carpel and style of which is said to be wing-margined. The corolla is equally large and full.

* This, from better specimens collected this year, confirms Mr. Black's opinion that it is a dwarf *R. alismæfolius*; but the uppermost leaf is often three parted, and the achenia have a small short beak, and are puberulent; the three-parted leaf, the puberulent achenia and too large flower separate it from *R. Flammula* var. *reptans*: and the mostly entire and narrow leaves, the globular head of carpels and the depauperate size (2 or 3 inches) from *R. affinis*, of which it has the achenia. I have seen only a single specimen.

† PAPAVER ALPINUM, L., was again collected by Dr. Parry, No. 147.

‡ This species—which holds its characters well—when described, was compared with our *C. rhomboidea* and *rotundifolia* on the one hand, and on the other, with the European *C. asarifolia*, which, so far as recorded, inhabits only central Europe. But I have just received from Kew a specimen collected by Dr. Lyall on the banks of the Ashtnoola River, in the Cascade Mountains of N. W. America, at about lat. 49°, which, so far as my means of comparison extend, appears to belong to *C. asarifolia*. The interesting bearing upon questions of geographical distribution is obvious,—viz.: as to the probable affiliation of *C. asarifolia*, *angulata*, *cordifolia*, *rhomboidea* and *rotundifolia*.

§ Specimens of this were sent by me to Dr. Hooker, to ask his opinion. He replies: "It is *Draba Johannis* of Europe, according to Mr. Ball, except that the flower is yellow. It is certainly also *D. crassifolia*, Graham, from Rocky Mountains. Drummond, and evidently the same as *D. Fladnitzensis*, Walp., and *D. lactea*, Adams, *D. pygmæa*, Turcz., and a host of others."

regarded by Regel, i. e., *D. muricella*, Vahl., with pubescent silicles, and a smooth form of *D. nemoralis*. 42. D. NEMORALIS, L., two pubescent forms. 44. D. AUREA, Vahl. 45. D. STREPTOCARPA, Gray, Enum. Pl. Parry, p. 13, No. 96, with some reduced, high alpine forms, in which the silicle does not always twist. 43. SMELOWSKIA CALYCINA, C. A. Meyer, (*Hutchinsia*, Desv.) High alpine. 46. THLASPI COCHLEARIFORME, DC. Common at all heights. 47. PHYSARIA DIDYMOCARPA, Gray, var.? The same as Parry's 101, but more hoary, and with a longer slender style. Mature fruit and seeds being still wanting, it yet remains as doubtful as before whether this is a form of Hooker's species. 48. VESICARIA LUDOVICIANA, DC. 49. VESICARIA MONTANA, n. sp.,* from the middle mountains; also collected last year at Eureka by Mr. Howard, but without fruit. 50. STANLEYA INTEGRIFOLIA, James. 51. THELYPODIUM (PACHYPODIUM, Nutt.) INTEGRIFOLIUM, Torr. and Gray.

CAPPARIDACEÆ.

52. CLEOME INTEGRIFOLIA, Torr. & Gray. 53. CLEOMELLA TENUIFOLIA, Torr.

VIOLACEÆ.

54. VIOLA BIFLORA, L. 55. V. NUTTALLII, Pursh. 56. V. MUHLENBERGII, var. *pubescens*, same as 108 of Parry. 57. IONIDIUM LINEARE, Torr.

PARNASSIEÆ.

575. PARNASSIA PARVIFLORA, DC., Hook. Two forms of the species, into which *P. Kotzebuei*, Cham., probably passes. It is No. 427 of Dr. Parry. 578. P. FIMBRIATA, Banks; a small form of the species; the flowers only half the size of those of the ordinary state. It is No. 428 of Parry's separate collection.

HYPERICACEÆ.

58. HYPERICUM SCOULERI, Hook., which apparently is also *H. formosum*, HBK.

ELATINACEÆ.

59. ELATINE AMERICANA, Arn. On the Platte River. (60. See Primulaceæ.)

CARYOPHYLLACEÆ.

61. SILENE SCOULERI, Hook. 62. S. DRUMMONDII, Hook. 63. LYCHNIS APETALA, L. vars., same as 132 and 133 of Parry. 64. SILENE MENZIESII, Hook. 65. SILENE ACAULIS, L.

66. PARONYCHIA PULVINATA, n. sp.,† the same as Parry's 297, of which he also has collected very fine specimens this year. 67. P. JAMESII, Torr. and Gray. 68. SAGINA LINNÆI, Presl. 69. ARENARIA (ALSINE) ROSSII, R. Br., the taller stems 3–5-flowered, pretty clearly a mere arctic-alpine form of *A.*

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*VESICARIA MONTANA (sp. nov.): argenteo-incana: caulibus e radice perenni diffusis foliosis; foliis spathulatis, radicalibus subovatis petiolatis nunc 1–2-dentatis; racemo fructifero elongato; silicula ovali seu ellipsoidea cano-pubescente stylo gracili longiore pedicello patente sursum curvato paullo breviore. Habit of *V. Ludoviciana. argyræa*, and *argentea*: well-marked by the oval or oblong silicle (which is, in some specimens, 3 lines in length, but of scarcely half that breadth, while in others it is shorter and broader, barely oval in outline,) hoary, with a fine stellular pubescence, one-third longer than the style, commonly one-third or one-half longer than the pedicel, nearly terete: the valves of the same rather firm texture as those of *V. Ludoviciana*, more convex than those of *V. alpina*. Seeds four or six in each cell, wingless. Petals spatulate, light yellow. Filaments filiform.

†PARONYCHIA PULVINATA (sp. nov.): depressa, e caudice lignescente pulvinato cæspitosa, fere glabra; stipulis argenteis ovatis integris mutidis folia oblonga obtusa margine ciliolato-scabra subæquantibus cum iis ramos breves usque ad florem terminalem sessilem dense vestientibus; calycis segmentis ovalibus late scariosis sub apice cucullato aristulatis, aristula cucullum vix superante. In the high alpine region, quite common. Forming dense, cushion-like tufts, apparently like those of *Silene acaulis*, denser than those of *P. sessiliflora*, Nutt. Stipules 2 lines long, broadly ovate and obtuse, or the uppermost somewhat taper-pointed or acute, but muticous. Leaves 2½ or 3 lines long, about a line wide, bright green, flat, thick, very obtuse and muticous, nerveless. Flower solitary and immersed among the leaves. Stamin dia 5, similar to the fertile filaments. Ovary glabrous, tapering into the rather short style.

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uliginosa, Schleich, (*Alsine stricta*, Wahl.) 77. A. ARCTICA, Stev., the same form as Parry's 141; and with it specimens of *A. biflora*, Wahl., var. *carnulosa*, Fenzl., with flaccid procumbent stems, and longer, lax, falcate leaves. If forms of the same, then *A. arctica* and *biflora* are properly united by Dr. Hooker. 79. A. FENDLERI, Gray.

70. STELLARIA UMBELLATA, Turcz. ? An ambiguous form, of the alpine region, with the capsules, seeds, and scarious bracts of *S. longifolia*, but with oblong, flaccid leaves, and petals wanting.* 73. From middle elevations, is a form of the same, without fruit. *S. alpestris*, var. *paniculata*, Fries, Herb. Norm., is perhaps the same, or a form connecting it with *S. longifolia*, but his *S. alpestris* var. *aliflora* is *S. borealis*. 71 and 76. S. LONGIPES, Goldie. 72. S. BOREALIS, Bigel., except the depauperate young specimens intermixed, which are the same as 70. 78. S. JAMESII, Torr. 74. MŒHRINGIA LATERIFLORA, Fenzl. 75. CERASTIUM ARVENSE, L., mixed with C. *vulgatum?* var. *Behringianum*, or *alpinum*, just as was Parry's No. 138 last year. (80. See under Scrophulariaceæ.)

PORTULACACEÆ.

81. TALINUM PARVIFLORUM, Nutt., or perhaps *teretifolium*, as the specimens are only in fruit. 82. CLAYTONIA VIRGINICA, L., from the alpine region. 83. C. ARCTICA? var. *megarhiza*, Gray, Enum. Pl. Parry (*C. megarrhiza*, Parry); specimens smaller than last year. 84. CLAYTONIA CHAMISSONIS, Esch. (*C. aquatica*, Nutt.); more luxuriant than the plant of Unalaschka, but otherwise similar: petals rose-color. (Dr. Parry again collected TALINUM PYGMÆUM, Gray, his No. 143.)

MALVACEÆ.

85. SIDALCEA CANDIDA, Gray. Cold springs, &c., on Blue River.† 86. MALVASTRUM COCCINEUM, Gray.

LINACEÆ.

87. LINUM PERENNE, L.

GERANIACEÆ.

88. GERANIUM RICHARDSONII, F. & M., the same as 112 of Parry. 89. G. FREMONTII, Torr., var. *Parryi*, Engelm., the same as Parry's 113, the fruiting pedicels divaricate!

RHAMNACEÆ.

90. CEANOTHUS FENDLERI, Gray. 91. C. OVATUS, Desf.

CELASTRACEÆ.

92. PACHYSTIMA MYRSINITES, Raf.

SAPINDACEÆ (ACERACEÆ.)

93. ACER GLABRUM, Torr., the ordinary form of the species.

LEGUMINOSÆ.

94. LUPINUS PUSILLUS, Pursh. 95. L. ORNATUS, Dougl.: "abundant at low and middle elevations." Very ornamental. 96. L. CÆSPITOSUS, Nutt., probably a form of *L. aridus*, Dougl. The keel is slightly ciliate. It was found "on Blue River, west of the range." 97. TRIFOLIUM DASYPHYLLUM, Torr. and Gr. Still finer and larger specimens than last year. 98. T. PARRYI, Gray, Enum. Pl. Parry.‡ 99. T. NANUM, Torr. 100. DALEA LAXIFLORA, Pursh.

* Dr. Parry also separately collected it, in fine fruiting specimens, in subalpine woods, on Mad Creek, &c., No. 431.

† This rare species was separately collected in Middle Park, by Dr. Parry. It is his No. 429. SIDALCEA MALVÆFLORA, Gray, (*S. Neo-Mexicana*, Gray,) Parry's 430, was collected with the last.

‡ TRIFOLIUM LONGIPES, Nutt. Sparingly collected by Dr. Parry in Middle Park, and distributed as his No. 434.

101. Psoralea lanceolata, Pursh. 102. P. floribunda, Nutt. 103. P. argophylla, Pursh. 104. Dalea alopecuroides, Willd. 105. Petalostemon macrostachyus, Torr. 106. Astragalus Kentrophyta (*Kentrophyta montana*, Nutt.) 107. Thermopsis rhombifolia, Nutt. (the smaller plant and the fruit), and apparently T. fabacea, var. *montana*, Gray (*T. montana*, Nutt.): the latter should be known by its taller stems, larger leaflets, and narrow, linear, pubescent, erect legumes. 108. Hosackia Purshiana, Benth. 109. Lathyrus ornatus, Nutt., and a pubescent variety. 110. L. linearis, Nutt. 111. L. polymorphus, Nutt. 112. L. palustris, var. *myrtifolius?* a small portion, and mainly Vicia americana, Muhl. 113. Astragalus racemosus, Pursh. 114. A. (Phaca, Hook.) bisulcatus, Gray; in fruit. 130. Same in flower. 115. A. (Phaca, Hook.) nigrescens, Gray. 116. A. (Phaca, Hook.) glabriusculus, var. *major*, foliolis anguste oblongis. Very likely, as Hooker conjectured, a form of *A. aboriginum*. A narrow, membranous, rudimentary false septum is borne on the dorsal suture, in the manner of *A. Robbinsii* and *A. alpinus*, to which, indeed, the species is related. It was collected in the mountains, "at middle elevation; not common." 117. A. oroboides, Hornem. (*Phaca elegans*, Hook.) "Along the bank of streams, at middle elevations, and subalpine." Very fine specimens, both in flower and in fruit; the former with linear leaflets, like the original *P. elegans;* the latter with broader and glabrate leaflets, just like Bourgeau's specimens from the Saskatchawan. 118. A. flexuosus, Dougl. (*Phaca flexuosa* and *P. elongata*, Hook.) Legumes straight or slightly curved. "Low mountains and plains; common." 119. A. gracilis, Nutt. With the last. 121. A. near *Phaca debilis*, Nutt., but larger in all its parts. To be determined hereafter in a general revision of the species.* 122. A. mollissimus, Torr., of which the stipules were wrongly described, a form with silvery instead of yellowish pubescence. Fine specimens, same as Parry's 184, doubtfully compared with *A. glareosus*, still without fruit. "On the plains; scarce." 123. A. Parryi, Gray: now collected with ripe legumes, which are so obcompressed and sulcate both sides that the sutures meet. "Common both on the low mountains and subalpine." 124. A. Drummondii, Hook. 125. A. alpinus, L. "From middle elevations to truly alpine." 126. A. cyaneus, Gray, Pl. Fendl. Specimens more luxuriant than Fendler's; the leaflets oval, half to two-thirds of an inch long, and young pods nearly two inches long. This is likely to be *A. Shortianus*, Nutt., of which I have seen no specimens; but the flowers are deep blue. "Low mountains, and rarely subalpine; a fine species." 127. A. Missouriensis, Nutt. 128. A. sparsiflorus, n. sp., to be elsewhere characterized in a revision of the North American species. "On low mountains; rare." 129. Perhaps a variety of the last, with more numerous flowers and larger legumes. 141. A. (Phaca) pauciflorus, Hook.? A glabrate, slender form, the same as *Phaca pauciflora*, Nutt. "South Park, common, apparently a good forage plant." (Fendler's, No. 144 is the same.) 130. A. (Phaca) bisulcatus, Gray, in flower. 131. A. (Phaca) lotiflorus, Hook., very fine specimens in flower and fruit. 132. (fruit) & 133. (fl.) A. caryocarpus, Ker. 134. A. (Phaca, Hook.,) pectinatus, Gray. 136. A. striatus, Nutt.! 137. A. (Phaca, L.) frigidus, with perfectly glabrous legumes, as in other American specimens. "Subalpine, in wet pine-woods." 138. A. (Phaca) filifolius, Gray, in Pacif. R. R. Exped. *Phaca longifolia*, Nutt. 139. A. Hypoglottis, L. 145. A. (Orophaca) sericoleucus, Gray (*Phaca sericea*, Nutt.); charming specimens of an interesting plant. 142. Homalobus decumbens, Nutt. Also 435 of Parry, very sparingly collected. Its name as an *Astragalus* can be settled only upon a revision of the species. 120. (and 433 of Parry,) Oxytropis deflexa, DC. 135. O. splendens, Dougl.; worthy of the name. 140. O. Lamberti, Pursh, with purple or blue, and with white

* The name *Astragalus debilis* could properly be retained for *Phaca debilis* of Nuttall. For there is no *A. debilis* of Douglas; that so given in Walp. Repert. 1, p. 710, being an accidental error for *A. miser*, Dougl.

flowers; "very ornamental and very variable." 143. O. ARCTICA, R. Br. "High alpine." 144. O. MULTICEPS, Nutt. in Torr. and Gray, Fl. (*Physocalyx multiceps*, Nutt. in herb. Acad.) "Subalpine and lower." This is Dr. Parry's No. 191, which I wrongly referred to *O. nana*, Nutt. The plant is more dwarf and the leaflets much smaller than in Nuttall's specimens, which are in fruit only, while ours, last year in blossom only, now show the young fruit in the bladdery calyx. It is a very pretty plant. 146. SOPHORA SERICEA, Pursh. 147. GLYCYRRHIZA LEPIDOTA, Nutt.

ROSACEÆ.

148. PRUNUS (CERASUS) PENNSYLVANICA, L. 149. SPIRÆA DUMOSA, Nutt. 150. S. OPULIFOLIA, L., var. *parvifolia*. 151. SIBBALDIA PROCUMBENS, L. 152. GEUM (SIEVERSIA) TRIFLORUM, Pursh. 156. G. (SIEVERSIA) ROSSII, Ser. 153. DRYAS OCTOPETALA, L. 154. POTENTILLA FISSA, Nutt. 155. P. FRUTICOSA, L. 157. P. CONCINNA, R. Br. 158. P. PENNSYLVANICA, L., var. *Hippiana*, Torr. and Gray. 159. P. FASTIGIATA, Nutt. ? which specimens of Parry's, in 1861, (with 217) ally to large states of *P. nivea*. (A glabrate specimen intermixed, is the same as Parry's 218, *P. Drummondii*, &c., Lehm.) 160. P. NIVEA, L., a form with the leaflets more deeply incised than in 215 of Parry. 161. P. PLATTENSIS, Nutt. ? the leaves more dissected, so as to be almost bipinnately parted; the same as a plant of Bourgeau's collection, from the Saskatchawan. "Common in wet ground; spreading." 162. P. PENNSYLVANICA, L., var. *strigosa*, Pursh, with some of the coarser No. 158, perhaps accidentally mixed. 163. RUBUS DELICIOSUS, James; the same as Parry's 210, with large white petals. This will be very ornamental in cultivation. 164. RUBUS TRIFLORUS, Richards., in fruit. 165. CERCOCARPUS PARVIFOLIUS, Nutt.* 462. CHAMÆRHODOS ERECTA, Bunge.

ONAGRACEÆ.

166. EPILOBIUM PALUSTRE, L. 167. E. ALPINUM, L. 168. E. PANICULATUM, Nutt. 169. E. LATIFOLIUM, L. 170. E. ANGUSTIFOLIUM, L. 171. GAYOPHYTUM RACEMOSUM, Torr. and Gray, with a specimen of 168 intermixed in my set. 172. G. RAMOSISSIMUM, Torr. and Gray; the var. *deflexum*, Hook., in Lond. Jour. Bot., 6, p. 224, where the names of the two varieties are transposed. 173. ŒNOTHERA MARGINATA, Nutt. 174. Œ. MISSOURIENSIS, Sims. 175. Œ. TRILOBA, Nutt. 176. Œ. NUTTALLII, Torr. and Gray, (*Taraxia longiflora* and *breviflora*, Nutt., the specimens belonging to the latter form), South Park. 177. Œ. PINNATIFIDA, Nutt. (see Parry, Enum., p. 40 (333), the hirsute specimen, which is just Parry's 116, and a canescently puberulent specimen, which, from its obcordate petals, should also be of this species, but not in fruit. 178. Œ. CORONOPIFOLIA, Torr. and Gray, exactly No. 222 of Fendler's collection. 179. Œ. SERRULATA, Nutt. 180 (and 436 of Parry). GAURA PARVIFLORA, Dougl. 181. GAURA COCCINEA, Nutt. 182. HIPPURIS VULGARIS, L.

LOASACEÆ.

569. MENTZELIA (BARTONIA) NUDA, Torr. & Gray. 570. M. (BARTONIA) MULTIFLORA, Nutt.; the form with cylindrical capsules. 571. M. ALBICAULIS, Dougl., (Parry's 126,) and some M. OLIGOSPERMA, Nutt.

CACTACEÆ.

183. OPUNTIA MISSOURIENSIS, DC., with a red flower also in my set, probably of O. RUTILA, Nutt.

GROSSULARIACEÆ.

184. R. LACUSTRE, Poir, var. (*R. setosum*, Dougl.) 185. R. LEPTANTHUM, Gray, Pl. Fendl. 186. R. CEREUM, Dougl. 187. R. HIRTELLUM, Michx. 188. R. AUREUM, Pursh.

* PURSHIA TRIDENTATA, DC., is No. 432 of Dr. Parry's separate collection, from Middle Park.

CRASSULACEÆ.

189. Sedum rhodanthum, Gray, Enum. Pl. Parry. In fruit; the inflorescence a dense spike-like thyrsus, oblong. 190. S. stenopetalum, Pursh. 191. S. Rhodiola, L. (192. See Borraginaceæ.)

SAXIFRAGACEÆ.

193. Saxifraga nivalis, var.? An undeveloped specimen of this, in Parry's collection of 1851, was referred to *S. hieracifolia?* But the well-developed specimens appear to pass into the large state of the next. The limits between *S. nivalis*, *Virginiensis* and *integrifolia* are not obvious. 194. S. nivalis, L., one form the same as Parry's 169; the other has a scape nine inches high, bearing several peduncled erect flower-clusters in a racemose manner, just as in 193, from which it differs in its shorter and smaller, more-toothed leaves. 195. S. cernua, L. 196. S. controversa, Sternb., referred by several authors to *S. adscendens*, L. Alpine region; before found in America only by Bourgeau, in the Rocky Mountains further north; known in Northern Asia. 197. S. bronchialis, L. 198. S. debilis, Engelm. n. sp.* "Alpine." 199. S. serpyllifolia, Pursh; but probably only a high alpine, very dwarf and tufted variety of *S. Hirculus*, L., this being the view taken of it in the Enumeration of Parry's collection of 1861, No. 164. The characters hold out in the present collection. 201. S. Hirculus, L., in the ordinary form, as different from 199 as possible. "South Park, in wet or swampy places." 200. S. flagellaris, Willd. (202. See under Primulaceæ.) 203. S. Jamesii, Torr., from the original stations. A most rare and peculiar species. 207. S. punctata, L. (*S. æstivalis*, Fisch.) 204. Heuchera parvifolia, Nutt., the large form,—viz.: Parry's 174,—with some specimens passing to Parry's 173, the small form. 205. Heuchera bracteata,† Seringe (*Tiarella? bracteata*, Torr.,) the same as Parry's 172, mixed with a large-flowered, apparently new species, H. Hallii.‡ Rocks, on mountains of medium elevation. 206. Lithophragma parvifolia, Nutt. 208. Mitella pentandra, Hook.; in fruit. 576. Chrysosplenium alternifolium, L. 568. Jamesia Americana, Torr. & Gray. (209. See Euphorbiaceæ.)

UMBELLIFERÆ.

210. Cymopterus glomeratus, DC. A plant rarely collected, but said to be very common on the plains, along with the next. 211. C. montanus, Nutt. 213. C. alpinus, Gray, Enum. Pl. Parry, p. 19 (408,) No. 158; with good fruit as well as flowers. 212. Peucedanum nudicaule, Nutt.? at least the plant so named in Hayden's collection on the *Mauvaises Terres* of Nebraska; but the plant is minutely pruinose-pubescent, not glabrous, nor is the fruit truly that of a *Peucedanum*, the marginal wings being double, nor from the description can it be the original *Smyrnium nudicaule* of Pursh. It must re-

* This was mixed with No. 167 (S. cernua, L.) of Dr. Parry's collection in 1861, but very sparingly distributed. It has a granulate root, so called, and the foliage much as in *S. Sibirica*, but is perfectly glabrous throughout, and with the obconical tube of the calyx wholly adnate to the ovary. As it is manifestly related to *S. rivularis* (though quite distinct), I suppose it may be the "*S. Cymbalaria*, vel. n. sp.," or the species compared with *Sibirica*, of Chamisso in Linnæa, 6, p. 555, which in the Flora Rossica are doubtfully referred to *S. rivularis*. In which case I know of no name to take precedence of this proposed by Dr. Engelmann.

† Heuchera bracteata (Seringe): glabella, minutissime pruinoso-glandulosa; thyrso denso spiciformi multifloro; bracteis sæpe flores flavido-virescentes subæquantibus; calyce oblongo fere ad medium 5-fido, lobis spathulato-oblongis; petalis attenuatis acutis filamentis vix latioribus; staminibus stylisque dein exsertis. Scape from a span to nearly a foot in height, often foliose-bracteate. Thyrsus commonly more or less secund. Flowers barely two lines in length. Teeth of the leaves usually setaceously mucronate.

‡ Heuchera Hallii (sp. nov.): hirsutula; thyrso racemiformi sublaxo 16–30-floro; bracteis pedicellos vix superantibus; floribus albidis (nunc roseo tinctis?): calyce lato-campanulato 5-lobo, lobis lato-ovatis; petalis spathulatis obtusis exsertis; staminibus stylisque inclusis. Scapes usually a span high. Flowers about three lines long, but the calyx twice the breadth of that of *H. bracteata*, and very different in shape. Pedicels, when fully developed, sometimes nearly as long as the flower. Leaves as in the preceding species, considerably variable.

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main uncertain until the order is revised. A solitary fruiting specimen in Dr. Parry's collection of 1861 was very carelessly named *Leptotænia dissecta*, which is quite a different plant. 214. MUSENIUM TRACHYSPERMUM, Nutt.; near *M. divaricatum*, but the young fruit much shorter as well as more scabrous. 215. THASPIUM TRACHYPLEURUM, n. sp.,* in fruit, the same as 159 of Parry in 1861, of which the fruit was too young. It proves to be quite different from that of *T? montanum*, var. *tenuifolium*. The genus is uncertain; but it can hardly be well separated from *Thaspium*. 217. T. MONTANUM, Gray, Pl. Fendl., in flower and in fruit, the latter with the three dorsal wings sometimes barely salient, sometimes as much developed as the marginal ones. 216. CONIOSELINUM FISCHERI, Wimm.; "alpine and subalpine." 218. C. CANADENSE, Torr. and Gray, probably a larger and coarser form of 216; "on low mountains." 219. ARCHANGELICA GMELINI, DC. 220. ARCHEMORA FENDLERI, Gray, Pl. Fendl.; fine, large specimens with good fruit, "in subalpine woods." It is 155 of Parry's 1861 collection, which I carelessly named *Berula angustifolia*. 221. An acaulescent Umbellifer, undeterminable for the want of fruit. 222. CYMOPTERUS? ANISATUS, n. sp., called "*C. terebinthinus*, var. *fœniculaceus*" in Parry's 1861 collection (No. 157); but it can hardly be either of Nuttall's species under those names, on account of the very long and subulate leaflets of the involucel as well as calyx-teeth, yet apparently related to them; the foliage, &c., very similar. Mature fruit not collected; some of the present collection pretty well formed has the wings abortive, while in younger fruits of 1861 these are obvious and somewhat undulate. This dubious plant inhabits "dry hills in the middle mountains, and is a very aromatic herb." The foliage of the dried specimens and the fruit have a pleasant anisate flavor,—characters unknown in the polymorphous genus *Cymopterus*, and rendering the genus of this plant yet more doubtful.

ARALIACEÆ.

223. ADOXA MOSCHATELLINA, L. "Subalpine; common."

CORNACEÆ.

CORNUS CANADENSIS, L. In the mountains Dr. Parry gathered one or two specimens of the ordinary form of this species; and in the alpine region also a depauperate form of it, some specimens of which, having a pair of leaves lower down on the stem, and those from the upper axils small, might readily be mistaken for *C. Suecica*. They are distributed as No. 437 of Parry.

CAPRIFOLIACEÆ.

224. LINNÆA BOREALIS, Gronov. 225. SYMPHORICARPUS MONTANUS, HBK. 227. S. OCCIDENTALIS, R. Br. 226. LONICERA INVOLUCRATA, Banks. 228. VIBURNUM PAUCIFLORUM, Pylaie.

RUBIACEÆ.

229. GALIUM BOREALE, L. 230. G. TRIFIDUM, L., the reduced, northern form, near *G. palustre*.

VALERIANACEÆ.

231. VALERIANA DIOICA, L., var. *V. sylvatica*, Richards.

* THASPIUM TRACHYPLEURUM (sp. nov.): glabrum; caule (pedali) striato 1-3-foliato umbellas 2-3 longiuscule pedunculatas gerente: foliis ternato-decompositis, segmentis filiformibus mucronulatis, petiolis basi dilatatis haud scarioso-marginatis; involucro et involucello e foliolis 1-3 subulatis parvis: floribus flavis: fructu didymo ovato lateraliter compresso, mericarpiis sectione transversali fere orbiculatis, jugis alisve 5 conformibus crassis suberosis obtusissimis scabris cum uno commissurali a carpophoro demum libero, valleculis omnibus grosse nnivittatis. On the mountains, at middle and lower elevations. Leaves more decompound than in the *T. montanum* var. *tenuifolium*, with which I had confounded it, the segments shorter and more rigid; the fruit shorter, 1½ to 2 lines long, the mericarps not at all flattened dorsally, in shape and scent like those of *Thaspium*, and the short wings remarkably thick and corky, scabrous-roughened. A similar corky mass at the commissure in the section simulates another wing or rib, except that it is partly divided by a groove, which receives the carpophore.

COMPOSITÆ.

232. ERIGERON ACRE, L. 233. DIPLOPAPPUS ERICOIDES, Torr. and Gray. 234. ERIGERON COMPOSITUM, Pursh. 235. E., a species wholly doubtful to me, with deep purple or blue rays,—except in this respect the same as the white-rayed specimens of Parry's No. 3, which I had confounded with those of *E. uniflorum*, with which it was mixed. I dare not now venture to describe it as a new species. 236. E. GLABELLUM, var. *pubescens*, Hook. Bourgeau collected the same form in the Rocky Mountains. 237. E. DIVERGENS, Torr. and Gr. 238. E. GRANDIFLORUM, Hook., var. *elatius*, Gray, Enum. Pl. Parry, No. 1: a still more luxuriant plant; stems more than a foot high, leafy to the summit, bearing two to four heads, with the same very woolly involucre. 243. E. UNIFLORUM, L., both the same as Parry's No. 8, and large and tall forms 6 to 9 inches high, with light-colored long wool to the involucre, as in the foregoing. "Common in the high alpine region." 239. E. GLABELLUM, Nutt. ? var. *molle*. This is recorded as a common species at all heights. But I have never before seen such a form, except one of Bourgeau's, the largest specimens distributed under "*E. canescens*," and that has white rays. From the shape of the leaves, and their size and abundance up to the summit of the stem, this should rather be referred to *E. macranthum;* but the pubescence is strange for that species. 240. E. GLABELLUM, Nutt. Parry's No. 4 (collected again) is a dwarfer form of the same, and belongs rather to *glabellum* than to *E. macranthum*. (241, 242. See below, under Aster. 243. See above.) 244. E. CÆSPITOSUM, Nutt.; a strict form, near the var. *grandiflorum*,—of which *E. canum*, Gray, Pl. Fendl., is evidently a form. "Common on low mountains." 245. E. PUMILUM, Nutt. 246. E. BELLIDIASTRUM, Nutt.

247. SOLIDAGO LANCEOLATA, L. 248. S. NEMORALIS, L.; a dwarf, subalpine form, passing to *S. nana*, Nutt. 249. S. MISSOURIENSIS, Nutt.; a dwarf form. 250. S. VIRGA-AUREA, L.; two forms. 251. S. VIRGA-AUREA, var. *multiradiata*, Torr. and Gray. Dr. Parry collected one specimen of *S. humilis* on Clear Creek.

241. ASTER SALSUGINOSUS, Richards. "Subalpine." This is also 403 of Dr. Parry's separate collection. 242. A. GLACIALIS, Nutt. "In the high alpine region." 252. A. ADSCENDENS, Lindl., var. *ciliatifolius*, Torr. and Gray, (which is also 419 of Parry,*) and the var. *Fremontii*, Torr. & Gray, Fl. Suppl. 253. Various forms of the last, "alpine and subalpine, in low grounds," the larger ones (same as Parry's 417) passing towards *A. integrifolius*, Nutt., but the involucre not manifestly glandular. All the peculiar Asters of the Rocky Mountains and westward require complete re-elaboration. 254. (also 418 of Parry,) A., near the smooth form of ERICOIDES, L., and probably a variety of it, but with laxer and narrower scales to the involucre. The rays are pinkish, as they sometimes are in the eastern plant. "In the mountains, at middle elevations."

255. APLOPAPPUS INULOIDES, Torr. and Gray. Subalpine, in the South Park. 256. A. (STENOTUS) PYGMÆUS, Gray, Enum., Pl. Parry, mixed with specimens of an equally dwarf new species, which Dr. Lyall collected, in 1860, on the summits of the eastern side of the Cascade Mountains, at 7500 hundred feet above the sea. It should therefore be named A. LYALLI.† Both high alpine.

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*ASTER (ORTHOMERIS) GLAUCUS, Torr. and Gray, not in the general collection, is again in Parry's separate collection (No. 13), in the finest state.

A. FENDLERI, Gray, Pl. Fendl. (perhaps a hispid form of *A. Nuttallii*,) was sparingly collected on sand hills, on the plains, but not distributed.

†APLOPAPPUS LYALLI (sp. nov.): nanus, undique pruinoso-glandulosus; caulibus 2–3-pollicaribus foliosis monocephalis: foliis integerrimis submembranaceis sæpius mucronatis, radicalibus inferioribusque oblongo-spathulatis seu oblanceolatis basi attenuatis, summis lanceolatis; involucri squamis laxe imbricatis subtriseriatis lanceolatis subæquilongis glanduloso-puberis; ligulis 16–20 linearibus longiusculis: acheniis linearibus fere glaberrimis: pappi albi setis rigidulis corollam disci æquantibus. Forma *a*. (LYALLI); involucri squamis omnibus lanceolatis sensim acuminatis,

257. A. (Pyrrocoma) croceus, n. sp.* Subalpine, in the Middle Park, &c., west of the Rocky Mountain range. 258. A. (Pyrrocoma) Fremontii. *Pyrrocoma foliosa*, Gray in Jour. Bost. Nat. Hist. Soc., 5, 1843. Low mountains, lat. 39°. There is a Chilian *A. foliosus;* wherefore, in suppressing *Pyrrocoma* as a genus, the name of this most rare and well-marked species may very properly commemorate the discoverer. 259. A. (Pyrrocoma) Parryi, Gray, Enum. Pl. Parry. 260. Chrysopsis villosa, Nutt., with the dwarf variety, *C. hispida*.

261. Iva axillaris, Pursh; a broad-leaved form. 262. I. ciliata, Willd. 263. Euphrosyne (Cyclachæna) xanthiifolia, Gray. 264. Franseria tomentosa, Gray, Pl. Fendl. 265. F. Hookeriana, Nutt.

266. Lepachys columnaris, Torr. & Gr. 267. Gaillardia aristata, Pursh. 268. Helianthella uniflora, Torr. and Gr. Fine specimens. The achenia are ciliate with very long hairs; the awns are long, slender and persistent.† 269. Helianthus pumilus, Nutt.? Parry's No. 50. 270. H. petiolaris, Nutt. 271. (& 420 of Parry.) Heliomeris multiflora, Nutt.; the broader-leaved form. 272. Helenium Hoopesii, n. sp., a most striking species, seeds of which were collected near Pike's Peak in the autumn of 1859, by Mr. Thomas Hoopes, from which plants were raised by Mr. Halliday Jackson, of Westchester, Pa.‡ 273. Actinella grandiflora, Torr. and Gr.; equally fine specimens as those of last year. 274. Actinella Richardsonii, Torr. and Gr. 275. A. scaposa, Nutt. var. (*A. glabra*, Nutt.) 276, 277. A. acaulis, Nutt., in different forms. 278. Bahia oppositifolia, Torr. and Gr. 279. Thelesperma (Cosmidium) gracile, Gray. 280. T. filifolium, Gray. 281. Villanova chrysanthemoides, Gray. 282. Hymenopappus tenuifolius, Pursh. 283. Chænactis achilleæfolia, Hook. Arn.; a low form from the alpine region. 284. C. achilleæfolia, var.

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exterioribus paullo brevioribus; foliis parvulis, caulinis superioribus gradatim minoribus (6–3 lin. longis) acutioribus. β. Halli: involucri squamis plerisque latioribus, extimis oblongo-lineari bus discum adæquantibus; foliis etiam caulinis magis spathulatis, summis pollicaribus capitulum adæquantibus, radicalibus bipollicaribus. Head half an inch long and wide. Ligules exserted, 3 or 4 lines long. Appendages of the style in the disk-flowers oblong-lanceolate. Ovaries in Hall and Harbour's plant sparsely beset with a few slender hairs; in Dr. Lyall's glabrous.

* Aplopappus (Pyrrocoma) croceus (sp. nov.): caule ultrapedali parce foliato monocephalo primum lanoso; foliis coriaceis glabris integerrimis haud eximie reticulatis, radicalibus oblongo-lanceolatis (cum petiolo pedalibus), caulinis lanceolatis oblongisve basi semi-amplexicaulibus; capitulo nudo maximo; involucri hemisphærici squamis ovalibus obtusissimis muticis, interioribus margine subscarioso-erosis; ligulis 50 et ultra louge exsertis supra croceis; ovariis brevinsculis glaberrimis; pappo albido corollam disci adæquante. Allied to *Pyrrocoma radiata*, Nutt., which, however, is probably not distinct from *Aplopappus* (*Pyrrocoma*, Hook.) *carthamoides*. But the leaves are less coriaceous and reticulated; the head naked, peduncled, and I believe nodding; involucre an inch in diameter; the long exserted rays nearly an inch in length; the ovaries far shorter, and the pappus white. But I have this only in flower, and *P. radiata* in fruit.

† The following, apparently quite distinct, new species of this genus, was sparingly collected by Dr. Parry in Middle Park, near the foot of Pike's Peak. I have also received a specimen from Mr. Hall. It is distinguished by its small leaves and heads, thin and scarious chaff, and the awnless achenia crowned with hyaline squamellæ, which are resolved into a villous fringe that equals the proper tube of the corolla in length.

Helianthella Parryi (sp. nov.): pedalis, hirsuta; foliis triplinerviis lanceolatis vel radicalibus spathulatis, caulinis superioribus sublinearibus 1-2-pollicaribus; capitulis 2–3 parvulis brevissime pedunculatis; receptaculi paleis tenui-scariosis apice truncato barbulatis; ovariis oblongis (exterioribus sæpius promisse, interioribus superne parce villoso-ciliatis) exaristatis; paleis pappi circ. 4 latis tennissime hyalinis in villum tubum proprium corollæ adæquantem solutis. Involucre only half an inch long; disk half an inch in breadth; ligules 7 to 9 lines long.

‡ Helenium Hoopesii (sp. nov.): caule valido tomentuloso sesqui-bipedali oligocephalo; foliis glauco-pallidis crassiusculis punctatis mox glabratis subnervatis integerrimis, radicalibus lanceolato-spathulatis in petiolum brevem alatum angustatis, caulinis oblongo-lanceolatis semi-amplexicaulibus; pedunculis sursum incrassatis; capitulis pro genere maximis; involucri squamis lanceolatis seu linearibus; receptaculo subgloboso; ligulis 20–25 linearı-cuneatis (pollicaribus) cum disco aurantiacis; pappi paleis lanceolato-subulatis enerviis corolla disci paullo brevioribus achenium sericeo-villosum æquantibus. "South Park and west of Pike's Peak." Radical leaves 6 to 11 inches long, tapering into a petiole-like base or flat and winged petiole; the cauline ones successively shorter and more dilated at the base, the uppermost 1½ to 2 inches long. Disk in the wild specimens an inch in diameter, and the numerous orange-yellow rays an inch long. Paleæ of the pappus tapering to a sharp point, but not awned. This species is one of those which go to fill the interval between *Helenium* and *Actinella*, but is clearly of the former genus.

Douglasii, (*C. Douglasii*, Hook. and Arn.) 352. PALAFOXIA HOOKERIANA, Torr. and Gray, with smaller heads.

285. MACHÆRANTHERA TANACETIFOLIA, Nees. (*Dieteria coronopifolia*, Nutt.) 286. GRINDELIA SQUARROSA, Dunal, with larger and with smaller heads. 287. (and 425 of Parry,) APLOPAPPUS RUBIGINOSUS, Torr. and Gr. 288. A. SPINULOSUS, DC. 289. TOWNSENDIA GRANDIFLORA, Nutt. 290. T. SERICEA, Hook.

291. ASTER (OXYTRIPOLIUM) ANGUSTUS, Torr. and Gr. (*Tripolium angustum* and *T. frondosum*, Nutt.) 292. LINOSYRIS (CHRYSOTHAMNUS) GRAVEOLENS, Torr. and Gr.; the form with small heads, and acute and viscid scales of the involucre. It occurs, much better developed, in Parry's separate collection, No. 415.* 293 (and 413 of Parry,) L. (CHRYSOTHAMNUS) PARRYI, n. sp.† A very distinct species, which is said to abound in the Middle Park, South Park, and all that district; the wonder is that it has not been detected before. The spiciform or racemose and leafy inflorescence, and the large heads with lax and taper-pointed scales, are characteristic. 295. L. (CHRYSOTHAMNUS) VISCIDIFLORA, Torr. and Gr.; the variety with broadish and hispidulous-ciliate leaves (*L. serrulata*, Torr.); again collected also by Dr. Parry, under his number 49. 294 (and 426 of Parry,) GUTTIERREZIA EUTHAMIÆ, Torr. & Gr. 296. MACRONEMA DISCOIDEA, Nutt. "Blue River, west of the Rocky Mountain range." An interesting rediscovery of a very rare plant.

297. PECTIS (PECTIDOPSIS, DC.) ANGUSTIFOLIA, Torr. Gravelly banks of streams.

298. ARTEMISIA ARCTICA, Less. (*A. Norvegica*, Fries); a more hairy form, —the same as Parry's 42, which I wrongly considered as a variety of *A. Richardsoniana*. "Strictly alpine." 299. A. SCOPULORUM, n. sp.,‡ a "strictly alpine" species, allied to *A. lanata*, and to be compared with *A. heterophylla*, Bess., which, however, is placed in the section *Abrotanum*, while this plant has the woolly hairs of the receptacle as long as the flowers themselves, in which respect it also differs from the very similar *A. Richardsoniana*. 300. A. CANADENSIS, Michx. 301. A glabrous form of the last, with small heads, too near *A. caudata* and some forms of the next. 302. A. DRACUNCULOIDES, Pursh, var. *brevifolia*, and specimens with trifid leaves passing into 301. 303, 305, (also 411 and 412 of Parry). A. LUDOVICIANA, a form with small leaves, and also the var. *gnaphalioides*. 304. A. FRIGIDA, Willd. 306. A. TRIDENTATA, Nutt.§ "On the Blue River, west of the Rocky Mountain range." 307. A. FILIFOLIA, Torr. (308. See Chenopodiaceæ.)

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* No. 414 of Parry's separate collection is a glabrate form of the same common species, of which only traces of the close and white down remain, and the leaves and heads are larger.

† LINOSYRIS (CHRYSOTHAMNUS) PARRYI (sp. nov.): fruticosa; ramis virgatis lanoso-dealbatis; foliis linearibus fere glabris subviscosis, floralibus conformibus capitula in thyrsum angustum congesta longe superantibus; involucro 10–15-floro cylindraceo pauciseriali, squamis sublaxe imbricatis albidis lanceolatis, omnibus (exterioribus sæpius folioso-interioribus scarioso-) attenuato-acuminatis; corollæ tubo hirsutulo; achæniis linearibus cano-pubescentibus. Leaves 2 to 3 inches long, 3-nerved, acute, plane, the larger ones 2 lines wide and tapering to the base. Thyrsus narrow, often almost simply racemose or spiciform, sometimes more compound and branchy. Heads about two-thirds of an inch long, foliose-bracteate; the bracts passing into the exterior and leafy-tipped scales of the involucre. Receptacle, styles, viscidity, aroma, &c., as in *Chrysothamnus* generally.

‡ Also No. 41 of Dr. Parry's separate collection of 1862 (not of 1861, which is *A. borealis*, a very different species.)

ARTEMISIA (ABSINTHIUM) SCOPULORUM (sp. nov.): cæspitosa: rhizomate repente; caulibus simplicissimis spithamæis; foliis albido-sericeis plerisque pinnati-3–5-sectis, segmentis præsertim radicalium tripartitis, lobis cum foliis summis linearibus angustis; capitulis pluribus vel paucis simpliciter racemoso-spicatis breviter pedicellatis erectis (lin. 2–3 latis), involucro hemisphærico, squamis ovalibus extus dorso villosis margine lato scarioso atro-fusco cinctis; lana receptaculi copiosa corollas superne longe pilosas adæquante. Var. MONOCEPHALA: caule 2–3-pollicari capitulo solitario majori terminato; foliis etiam radicalibus simpliciter tripartitis vel partim 5-partitis partim integerrimis linearibus. Stems sericeous-pubescent, sometimes glabrate below. Floral leaves or bracts filiform, linear, entire, the lower surpassing the head. Pedicels a line or a line and a half long, strictly erect. Flowers 30 or more, tipped with purplish.

§ This is 410 of Parry's separate collection, from Middle Park; and his 409, associated with the above, is A. CANA, Pursh; these two being the *Wild Sage* of Lewis and Clarke.

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309. ANTENNARIA CARPATHICA, var. *pulcherrima*, Hook. A remarkable and leafy-stemmed form.* 310. A. DIOICA, Gærtn., and A. ALPINA (female, 1–3-cephalous), mixed. Good specimens of *A. alpina* were separately collected on Mount Flora by Dr. Parry, No. 422. 311. GNAPHALIUM STRICTUM, Gray in Bot. Whippl., Exped. Pacif. R. R. Surv. 4, p. (54) 110; a less strict and many-stemmed form. "Wet places in the mountains." 312. G. DECURRENS, Ives. "Subalpine; rare."

313 (and 423 of Parry). BRICKELLIA GRANDIFLORA, Nutt., var. *minor*: foliis profundius cordatis capitulisque minoribus; involucri squamis acutioribus. 314. NARDOSMIA SAGITTATA, Hook., var. with very obtuse leaves, connecting with *N. frigida*. "Near Pike's Peak." 315. LIATRIS PUNCTATA, Hook.

316. SENECIO LUGENS, Richards., a typical form, and others belonging to *S. fastigiatus* and *S. exaltatus*, Nutt., but dwarf. "A common and variable species, at all heights and in all situations, flowering from June to September." 326. A dwarf form of the same, nearly Parry's 21, and just Fendler's 477. 325. S. LUGENS, the downy state, same as Parry's 23, one of the forms of *S. exaltatus*, Nutt. 317. S. AMPLECTENS, Gray, Enum. Pl. Parry, p. 11, No. 56, a species which, considering the various forms under which it now occurs, was not very well named. A new specific character is appended.† It is a sub-alpine and alpine species.

318. S. INTEGERRIMUS, Nutt. A low form; "alpine." 319. S. SOLDANELLA, n. sp.‡ "High alpine, among rocks; heads generally single." They are solitary in all the specimens I have seen.§ 320. S. CERNUUS, Gray, Enum. Pl. Parry, No. 52. "A common species at middle and subalpine elevations." 321. S. BIGELOWII, var. *Hallii*.‖ "Subalpine; heads very drooping, rayless." 322. S. FREMONTII, Torr. and Gr. "Alpine;" a well-marked species. Recently collected by Dr. Lyall on the summit of the Rocky Mountains, in lat. 49°.¶ 323. S. TRIANGULARIS, Hook., with shorter and finer teeth to the leaves, the

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* ANTENNARIA MARGARITACEA, R. Br., var. *subalpina:* caule spithamæo ad subpedalem simplicissimo, corymbo congesto fere capitato. A singular, nearly alpine form, collected only by Dr. Parry, No. 421.

† SENECIO AMPLECTENS (Gray, l. c.): lana floccosa mox decidua glabratus; caule semi-sesquipedali e radice perenni apice nudo 1–3-cephalo; foliis membranaceis oblongis lingulatisve aut repando aut argutissime dentatis nunc sublaciniatis, imis basi angustatis vel in petiolum alatum attenuatis, superioribus sessilibus basi (nunc lata) semi-amplexicaulibus; capitulis in pedunculo gracili nutantibus; involucro calyculato laxo; ligulis linearibus elongatis (1–2-pollicaribus) aureis; acheniis glaberrimis.

Var. TARAXACOIDES (*S. Fremontii*, var.? Gray, Pl. Parry, p. 9, No. 28): vere alpinus, 4–5-pollicaris, monocephalus; capitulo minori minus nutante (ligulis semi-subpollicaribus); foliis omnibus basi attenuatis pl. m. laciniatis. In the high and bare alpine region. This, judging from intermediate forms in Hall and Harbour's collection, must be regarded as a depauperate, alpine variety of *S. amplectens*. Dr. Parry gathered only two or three specimens, like those of the former year.

‡ SENECIO SOLDANELLA (sp. nov.): subcaulescens, nanus, glaberrimus, subglaucus, fere semper monocephalus; radice fasciculato-fibrosa; foliis crassis subtus purpureo tinctis, radicalibus imisque orbiculatis nunc subreniformibus nunc basi trinervata in petiolum longum seu longissimum planum contractis sæpius denticulatis (circiter pollicem diametro), superioribus 1–2 minoribus oblongis spathulatisve petiolo brevi dilatato; capitulo magno (8–9 lin. longo et lato); involucro e squamis lanceolatis scarioso-marginatis 16–20 cum exterioribus 7–9 angustioribus immarginatis laxioribus vel paullo vel dimidio brevioribus; ligulis oblongis 16–18 (flavis circiter 4 lin. longis) discum vix superantibus; acheniis glaberrimis. "On Gray's Peak," Dr. Parry,—who complimented the describer by naming this handsome and most distinct species, *S. Grayi;* but the *S. Greyi*, Hook., f. of New Zealand forbids this.

§ In Middle Park, Dr. Parry gathered one or two specimens of what appears to be *S. hydrophilus*, Nutt.

‖ SENECIO BIGELOWII, (Gray in Bot. Whippl. Exped. Pacif. R. R. Surv. 4, p. (55) 111), var. *Hallii:* foliis fere omnibus lanceolatis cum caule pilis articulatis pubescentibus (demum glabratis), caulinis omnibus sessilibus imisve in petiolum alatum contractis. *S. megacephalus*, Nutt., thus far found only by Nuttall, has a similar pubescence, but more of it, and also on the involucre; the scales of the latter are narrower, the heads are radiate and erect, and the plant is dwarf.

¶ SENECIO FREMONTII, (Torr. & Gray, Fl. 2, p. 445): totus glaber; caule simplici vel corymboso-ramoso usque ad apicem folioso (5–15-pollicari); foliis oblongis vel obovato-spathulatis carnosulis plerisque laciniato-dentatis omnibus sessilibus, superioribus pollicaribus vel sesqui-pollicaribus, inferioribus decrescentibus, capitulis solitariis paucisve brevissime pedunculatis erectis; involucro campanulato (semipollicari) parce bracteato; ligulis 10–16 luteis; acheniis puberulis.

var. *β*, Torr. and Gr. Fl., verging towards the next. 324. S. ANDINUS, Nutt.? from the locality (but the heads resemble those of the last, and are of equal size), or an undescribed species, if Nuttall's *S. andinus* is Hooker's *S. serra;* intermediate between the latter and *S. triangularis.* Fremont collected a single specimen of it in his second expedition. 327. S. EREMOPHILUS, Richards. 328. S. LONGILOBUS, Benth., from the plains, with pinnately-parted leaves (Parry's No. 407); with a mountain form, having the leaves all entire and the heads narrow. The latter is the same as Parry's No. 406. The variations of *S. filifolius, longilobus, spartioides* and *Riddellii,* are now wholly inextricable. 330. S. CANUS, Hook., a form with large heads and the leaves all entire, the same as Parry's No. 20; "alpine and subalpine." 229. S. AUREUS var. *alpinus,* Gray, Enum. Pl. Parry, No. 63. This holds its character; but the heads are sometimes as many as three in a corymb. Different from *S. aureus* as it appears, it is inseparably connected with it through the var. *borealis.* 313. S. AUREUS, var. *alpinus, werneriæfolius,**—very peculiar, truly alpine form, which would almost anywhere be regarded as a very distinct new species; but I think it runs into the last and into Wright's 403, &c. These forms all teach that *S. subundus,* DC., and *S. resedifolius,* Less., will also pass into *S. aureus.* Indeed, I know not where the species will stop. 332. S. AUREUS, L.? var. *croceus.* Middle Park, &c. Both Dr. Parry (who has it as No. 405) and Mr. Hall note this as a form of the common *S. aureus* with copper-colored or saffron-colored flowers, and I cannot gainsay it, after reviewing a suite of specimens. Some of Hall and Harbour's specimens, except in the anomalous color of the flowers, very much resemble *S. aquaticus* of the Old World. One form is discoid. 333. S. AUREUS, var. *borealis* and var. *Balsamitæ,* Torr. and Gr.; glabrate or woolly, in various forms. "A common and very variable species, at all localities and heights, except strictly alpine. Some of the specimens are passing to *S. Fendleri,* Gray.

334. ARNICA ANGUSTIFOLIA, Vahl.; broad-leaved forms of *A. alpina,* Læst. "A variable species, from the low middle to the alpine region, flowering early and late." 335. A. MOLLIS, Hook.; "alpine and subalpine." 336. A. CORDIFOLIA, Hook., mixed with some A. LATIFOLIA, Bongard, (which Dr. Parry abundantly gathered in Berthoud's Pass; No. 408 of his collection); the latter known by the sessile cauline leaves, the narrower heads, and the almost glabrous achenia. 337. A. CHAMISSONIS, Less. South Park, &c. Passes into leafy forms of *A. angustifolia.* 338. A. ANGUSTIFOLIA? var. *eradiata,* or perhaps a distinct species. This is Parry's No. 10, resembling some rough-hirsute forms of *A. angustifolia,* approaching *A. mollis,* but the cauline leaves decreasing upwards; and the rayless character holds in the numerous specimens gathered in 1862: the achenia are glabrate, although the ovaries are pubescent. It can hardly be a form of the Californian *A. discoidea;* but it needs farther comparison with that species.*

339. CIRSIUM ACAULE, All., var. *Americanum.* "Subalpine; common in wet

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* SENECIO AUREUS, L., var. (ALPINUS) WERNERIÆFOLIUS: multicipiti-cæspitosus, primum arachnoideus; foliis radicalibus confertis spathulato-oblanceolatis seu spathulato-linearibus basi attenuatis erectis coriaceis rigidis aveniis integerrimis marginibus sæpissime revolutis mox glabratis (cum petiolo 2–4-poll. longis 2–3 lin. latis); scapo aphyllo, (3–5-pollicari) bracteis paucis subulato-setaceis lana obvolutis instructo corymboso-3–5-cephalo; capitulis, etc., *S. aurei.* The leaves may be likened to those of *Werneria* or of *Calcitium longifolium* or *nivale.*

The following might be thought to be a form of this, or of Wright's 403; but, besides the small leaves, the achenia are papillose-hirsute, instead of perfectly glabrous.

SENECIO THURBERI (sp. nov.): cæspitosus, cano-tomentulosus mox glabrescens; foliis plerisque radicalibus confertis angustissime linearibus basi sensim attenuatis (cum petiolo circiter pollicem longis) rigidulis integerrimis vel obsolete 2–3-dentatis marginibus quandoque revolutis; scapo spithamæo 3–5-cephalo foliis perpaucis subulatis bracteisve instructo; capitulis fere *S. aurei,* sed acheniis crebre papilloso-hirtellis! *S. canus,* var. *pygmæus,* Gray, in Bot. Mex. Bound. p. 103. Santa Rita del Cobre, New Mexico, Prof. Thurber, Dr. J. M. Bigelow.

† TETRADYMIA CANESCENS, DC., the form with rather smaller heads and shorter leaves (*T. inermis,* Nutt.), was collected in the Middle Park by Dr. Parry, No. 416.

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grounds." Stemless and polycephalous; at least my specimen has four heads nearly sessile on the crown, of equal size with those of the European plant, with which the specimens very well agree, except that the exterior scales of the involucre are all tipped with a manifest spine. Some of the leaves are barely sinuate, as in the common Siberian variety; others are nearly as deeply pinnatifid as in the European plant. 340. C. EDULE, Nutt.? so named in Parry's former collection; but very probably not that species. In the lack of certain original materials, and of a complete re-examination, I could not pretend to name the Thistles of the Rocky Mountains, Oregon, &c., and am not disposed to add to the existing confusion. 341. C. "a white-flowered species," between the last and *C. foliosum*, (Hook.) DC., if Bourgeau's plant from the Saskatchawan is rightly named.*

343. C. DRUMMONDII, Torr. and Gr. Caulescent and leafy-stemmed, the exterior flowers having a sparingly plumose pappus: certainly very near *C. pumilum*. 342. ECHINAIS CARLINOIDES, Cass., var. *nutans*, DC. "Mountains, at middle elevations, and subalpine; and in fertile, open valleys of Middle Park, where it is very common, and certainly indigenous." I have a specimen of this collected by Mr. Samuels in California, which I had thought probably an introduced plant. But it would appear to be truly American as well as Asiatic. The specimens accord with Schrank's and with De Candolle's figures of the Caucasian and Himalayan plant, although, perhaps, the appendages of the involucral scales are a little more dilated.

344. MULGEDIUM PULCHELLUM, Nutt. 345. LYGODESMIA JUNCEA, Don. 346. STEPHANOMERIA RUNCINATA, Nutt. 347. LYGODESMIA JUNCEA, var.? *rostrata*.† "On the plains; Sept.; rare." 348. CREPIS RUNCINATA, Torr. and Gr. 349. HIERACIUM TRISTE, Willd. 350. H. ALBIFLORUM, Hook. "Subalpine, west of the range; rare."‡ 351. NABALUS RACEMOSUS, Hook. "South Park; rare;" a low form. 352. See above, p. 66. 353. CREPIS OCCIDENTALIS, Nutt. The same as Parry's 70, omitted accidentally. 354. TROXIMUM GLAUCUM, Nutt., var. foliis dilatatis laciniato-pinnatifidis, segmentis lanceolato-attenuatis. Evidently a form of Parry's 65. Mr. Hall notes that it "flowers in May and the early part of June, on low mountains," and must be different from the next, which flowers two months later in the same localities. 355. MACRORHYNCHUS TROXIMOIDES, Torr. and Gr. (*Troximon aurantiacum*, Hook.); in a great variety of forms, large and small, from a foot and a half to as many inches in height, with entire, toothed, or laciniate-pannatifid leaves; the size of the heads equally variable, and with yellow, orange, chocolate-colored or purple corollas. "Very variable at all heights, even alpine; flowers in July and August." The full suit of specimens show that to this clearly belongs *Troximon parviflorum* and *T. roseum*, Nutt., and *Macrorhynchus purpureus*, Gray, Pl. Fendl. The fruit, when well developed, is rostrate, with a beak of about equal length with the body of the the achenium. 356. TROXIMON GLAUCUM, Nutt., var. *dasycephalum*, Torr. and Gr. (*T. taraxacifolium*, Nutt.) "High alpine; seemingly different from any of the above." It is also 424 of Parry's separate collection, from Berthoud's Pass. 357. TARAXACUM MONTANUM,

* CIRSIUM ERIOCEPHALUM, sp. nov., will be the most appropriate name for the high-alpine Thistle which I mentioned in the enumeration of Parry's collection, 1861, p. 9, as *C. foliosum*, Hook.? It was again collected in 1862, nearly in single specimens, both by Mr. Hall and Dr. Parry. It is remarkable for the heads of yellow flowers being crowded into a capitate cluster, as large as a man's fist, foliose-involucrate with very spinose bracts, and clothed with long and very soft, implexed, perhaps deciduous wool: the stem a foot or two in height, very leafy; the leaves linear, canescent beneath, pinnatifid, the lobes very short and crowded, armed with slender spines.

† LYGODESMIA JUNCEA, Don., var. ROSTRATA: achæniis apice rostrato-attenuatis; capitulis sæpe 8–9-floris; foliis angustissime linearibus elongatis (in hisce specim. 3–4-pollicaribus). Heads rather larger than is usual in *L. juncea*; achenia half an inch long, the tapering apex directly contradicting the generic character "not contracted at the apex," as here they may be said to be beaked. Dr. Hayden collected the same form on the Laramie Mountains. The species all need to be defined anew.

‡ To this belongs Parry's No. 71 of the 1862 collection.

Nutt., a form of *T. palustre*, DC. "In the mountains, at middle elevations, in wet ground; different from *T. Dens-leonis*, which was also met with, truly indigenous." (In the high alpine region were collected a few specimens of another form,—viz.: of a very depauperate *T. lævigatum*, DC.)

CAMPANULACEÆ.

358. CAMPANULA ROTUNDIFOLIA, L., an ordinary form. 359. C. LANGSDORFFIANA, Fischer; excellent specimens of Parry's 266, exhibiting the same characters. It is said to be "very common in the subalpine region and lower, in wet ground." 360. C. UNIFLORA, L. "Pike's Peak; high alpine." 361. C. APARINOIDES, Pursh, a depauperate form.

ERICACEÆ.

362. VACCINIUM MYRTILLUS, L. "Alpine and subalpine;" in flower and fruit, connecting the small-leaved form with the ordinary European plant. 363. V. CÆSPITOSUM, Michx. 364. ARCTOSTAPHYLOS UVA-URSI, Spreng. 365. GAULTHERIA MYRSINITES, Hook. 366. PYROLA SECUNDA, L. 367. P. ROTUNDIFOLIA, L., var. *uliginosa*, Gray. 368. P. CHLORANTHA, Swartz; a small form. 369. P. (MONESES) UNIFLORA, L. 370. KALMIA GLAUCA, L., the very dwarf form from the "high alpine" region. 371. PTEROSPORA ANDROMEDEA, Nutt.

PLANTAGINACEÆ.

372. PLANTAGO ERIOPODA, Torr. (For the synonymy, see Proceed. Amer. Acad., 6, p. 55, note.) 373. Apparently the same species, with hardly any wool at the crown,—which happens in other species. "High alpine, near perpetual snow." 374. P. PATAGONICA, Lam., var. *gnaphalioides*, Gray.

PRIMULACEÆ.

375. ANDROSACE FILIFORMIS, Retz. "Subalpine; not rare."* 376. A. SEPTENTRIONALIS, L. "Below the subalpine region and also alpine."† 377. A. OCCIDENTALIS, Nutt. "On the plains." 202. A. CHAMÆJASME, L. (*A. carinata*, Torr.) High alpine on Pike's Peak, where Dr. James collected it. 378. PRIMULA FARINOSA, L., var. foliis sessilibus; umbella capitata; calyce cylindraceo tubum corollæ subæquante. *P. dealbata*, Engelm. in litt. But it exactly accords with the left-hand figure of *P. farinosa*, var. *Magellanica* of Hooker's Flora Antarctica (*P. decipiens*, Duby), and with my Antarctic specimens, except that the calyx is perhaps a little longer, and the corolla bluish-purple. Mr. Burke collected the same form on the Rocky Mountains farther north, but with the tube of the corolla a little exserted. Bourgeau collected specimens in the Saskatchawan district, having this elongated calyx-tube along with pedicels of ordinary length. It is interesting thus to connect the Antarctic with the northern forms, by specimens from the Rocky Mountains in about lat. 40°. 379. P. PARRYI, Gray, Enum. Pl. Parry, No. 311. "Alpine and subalpine; common." This holds its characters, except that the specimens of 1862 are generally less luxuriant, and the divisions of the corolla less bifid; indeed, in some of those of Dr. Parry's later collection they are barely emarginate; and in a few of them the calyx is very little glandular, and its lobes are ovate-lanceolate. The longer pedicels of the umbel are 1½ to 2 inches, or in fruit even 3½ inches, in length. Capsule short-ovid, half an inch long, slightly shorter than the calyx-lobes. The thick root is said by Dr. Parry to be very

* *Androsace filiformis*, Retz., a Siberian species, of which beautiful specimens are in the collection, is now first recorded as of the American flora. It has, however, long since been collected in the Rocky Mountains by Fremont, in his first expedition (in whose report it was wrongly named *A. occidentalis*, Nutt.); by Burke (ex. Herb. Hook.); and more recently by H. Engelmann, in whose collection it was mistaken for *A. septentrionalis*. From the latter, beyond the characters assigned by authors, it is well distinguished by its almost hemispherical calyx, scarcely if at all angled, and with short and flat, not foliaceous teeth.

† Dr. Parry's 313 *a* of 1862, is the high alpine form of this.

fragrant. Seeds of this handsome Primrose were copiously collected, from which we may hope to have the plant in cultivation. 380. P. ANGUSTIFOLIA, Torr. 381. DODECATHEON MEADIA, L., the same form as Parry's 312. 382. LYSIMACHIA CILIATA, L. "Mountains at medium height." 60 and 577. GLAUX MARITIMA, *L.*, in flower and in fruit.

LENTIBULARIACEÆ.

580. UTRICULARIA VULGARIS, L.? Without flowers. In a subalpine lake.

OROBANCHACEÆ.

383. APHYLLON FASCICULATUM, Torr. and Gray.

SCROPHULARIACEÆ.

384. PENTSTEMON GLABER, Pursh; same as Parry's 260. 385. P. ACUMINATUS, Dougl., agreeing with Bentham's character "filamento sterili glabro," which is very rarely the case, but a very narrow-leaved variety, just *P. secundiflorus*, Benth., excepting the glabrous sterile filament. "Mountains at low and middle elevations." 386. P. ACUMINATUS, Dougl., the ordinary form of the region (*P. nitidus*, Dougl., *P. Fendleri*, Gray), Parry's 258. 390. P. ACUMINATUS, Dougl., in some sets the common broad-leaved form, in others a variety with still narrower leaves than Parry's 264, i. e., a form almost exactly passing into *P. cæruleus*, Nutt., the name which may probably have to be adopted for the combined species. "Plains; May." 387. P. HUMILIS, Nutt., taller than Parry's 257, much larger than Nuttall's specimen. "Low mountains, an early and pretty species." Dr. Lyall has recently collected it in lat. 49°, at the elevation of 7000 feet. 388. P. HALLII, n. sp., described in "Revision of Genus Pentstemon," in Proceed. Amer. Acad. 6, p. 70,—which memoir see for remarks on most of these Pentstemons. This is a most beautiful dwarf species, "not uncommon in the alpine region, descending into the subalpine," the rich blue purple flowers large for the size of the plant. Dr. Parry must have overlooked it in 1861 by confounding it with his 259 (*P. glaber*, var. *alpinus*,) which, externally, it much resembles, but its affinities are with a different group. 389. P. ALBIDUS, Nutt. "Plains; flowers white." 391. P. CONFERTUS, Dougl., var. *purpureo-cæruleus*, Gray, Rev. Penst. (*P. procerus*, Dougl.) A taller form of this, with large radical leaves, was sparingly gathered by Dr. Parry in the Middle Park. 392. P. GLAUCUS, Graham? var. *stenosepalus*, Gray, Rev. Penst. p. 70; the No. 262 of Parry. "South Park and Pike's Peak; alpine and subalpine." 393. P. CÆSPITOSUS, Nutt., Gray, Rev. l. c., p. 66. "South Park, at middle elevations." "Near the Upper Platte, first found by Mr. J. Harbour." Parry. A neat and very dwarf species, named by Nuttall, but unpublished, having been confounded with *P. pumilus*. 394. P. PUBESCENS, Soland., var. *gracilis*, Gray, l. c. *P. gracilis*, Nutt. 395. P. BARBATUS, Nutt., var. *Torreyi*, Gray. 396. P. HARBOURII, n. sp., Gray, Rev. Penst. p. 71. "Mount Breckenridge on Blue River, west of the main range, in the high alpine region near perpetual snow." A very distinct and dwarf species, named after its discoverer. 397. CHIONOPHILA JAMESII, Benth. High alpine, Pike's Peak, &c. Ripe seed having been collected, we may hope that this most rare and interesting plant may become known in cultivation.

398. MIMULUS LUTEUS, L.* 399. M. JAMESII, Torr., var. *Fremontii*, Benth.; apparently a form of *M. glabratus*, HBK. 400. M. FLORIBUNDUS, Dougl. 401. M. RUBELLUS, Gray in Bot. Mex. Bound. p. 116; but the limb of the corolla apparently yellow. "Subalpine; scarce." The same plant occurs in Dr. Lyall's collection on our northwestern boundary, from the Cascade

* M. LUTEUS, L. var. ALPINUS; caulibus 3-pollicaribus e basi decumbente vel repente 1-3-floris; foliis plerisque sessilibus subintegerrimis. Alpine region, 135*a* coll. Parry. 1862. Very glabrous. Farther north, Dr. Lyall collected a similar, but puberulent and smaller-leaved variety.

Mountains. 402. Collinsia parviflora, Nutt. 80. Limosella aquatica, L. Apparently just the European plant. "Low mountains." (403, 404. See Polemoniaceæ.)

405. Synthyris plantaginea, Benth. Parry's 254, with a little P. alpina, Gray, Parry's 255.* 406. Veronica serpyllifolia, L., an elongated form. 407. V. alpina, L. 408. V. Americana, Schweinitz.

409. Castilleia breviflora, Gray, Enum. Pl. Parry, No. 243, and p. (338) 45. *Euchroma*, Nutt. "High alpine." 410. C. integra, Gray. 411. C. pallida, var. *miniata*, Kunth., Gray, l. c., (often with laciniate leaves,) with a dwarf form of *C. pallida* having purple bracts, Parry's 239 † 412. C. pallida, the *C. septentrionalis*, Lindl. 413. Orthocarpus luteus, Nutt. 414. Pedicularis racemosa, Benth. "Subalpine; common in pine woods." 415. P. crenulata, Benth., in DC. Prodr. "Subalpine and alpine, South Park." This species was known only from very poor specimens collected by Fremont. These are good ones, but of a more dwarf and alpine form; stems only 6 to 9 inches high, glabrate, except some decurrent lines of pubescence; the leaves smaller and narrower. Corolla in the dried specimens of a deep violet-purple. 416. P. Canadensis, L. "In the mountains of middle elevation;" not before known in this region. 417. P. bracteosa, Benth. 418. P. procera, Gray, Enum. Pl. Parry, No. 252. 419. P. Grœnlandica, Retz. *P. surrecta*, Benth., varying from 4 to 16 inches high, and also in the length of the beak. 420. P. Parryi, Gray, Pl. Parry, No. 251. 421. P. Sudetica, Willd. var. Like the specimens of the preceding year; and Dr. Parry also collected a more dwarf state. "Flowers red." 422. Rhinanthus Crista-galli, L., var. *minor*.

LABIATÆ.

423. Hedeoma hispida, Pursh. 424. H. Drummondii, Benth. 425. Mentha Canadensis, L., var. *glabrata*. 426. Salvia trichostemoides, Pursh. Probably a form of *S. lanceolata*, for which Bentham takes it. 427. S. Pitcheri, Torr. 428. Monarda aristata, Nutt. 429. Lophanthus anisatus, Benth. 430. Dracocephalum parviflorum, Nutt. 431. Scutellaria resinosa, Torr.: pubescent and glabrate forms. 432. S. galericulata, L.

BORRAGINACÆ.

433. Echinospermum Redowskii, Lehm., and a depauperate, diffuse or procumbent form of Eritrichium Californicum, DC. 434. Eritrichium crassisepalum, Torr. and Gr.; the specimens hispid with rough, spreading hairs, and the achenia granulate, and also a more upright and narrower-leaved species, with pointed and smooth achenia, the same as Fendler's 635, named by Torrey *E. micranthum*, sp. nov., and afterwards in my herbarium referred to *E. angustifolium*, Torr., which it hardly is. I think it is also *Cryptanthus hispidus*, Nutt., ined. 435. E. Jamesii, Torr. Very well marked by the smooth and acute-angled achenia, the section of each just a quadrant of a circle. 436. Heliotropium (Euploca, Nutt.,) convolvulaceum, Gray. 192. H. Curassavicum, L. Doubtless indigenous. 437. Echinospermum floribundum, Lehm. 438. Eritrichium glomeratum, DC.; a fine virgate form, like Parry's 288, and a form with shorter and more branched inflorescence. (439, see Hydrophyllaceæ.) 440. E. aretioides, DC. Beautiful specimens, like those of Parry's 278 in 1861; some of them Aretia-like, and only an inch high; others with elongated flowering stems two inches high. While

*The latter, again copiously collected by Dr. Parry, in the high alpine region, holds its characters. (The leaves are sometimes rotund-ovate and manifestly cordate.) But a suite of specimens supplied by Mr. Hall shows gradations between the two.

† Parry's 240, again sparingly collected in the alpine region, is a similar form of *C. pallida*, with a short galea and bright red bracts, occasionally parti-colored with white: his 242 a dwarf, pale, alpine form, *C. occidentalis*, Torr.

the scanty remains of the fruit of the former collection were analogous to that of *E. nanum* var. *Terglovense*, DC., well-formed fruit of the present collection is nearly as *E. villosum* is described and figured, having an inflexed margin with ciliate-spinulose teeth, thus lending confirmation to Dr. Hooker's view. And the back is almost as concave as in an *Omphalodes*. It will thus apparently take the name of *E. villosum* var. *aretioides*. 441. LITHOSPERMUM PILOSUM, Nutt.; same as 295 of Parry. 442. MERTENSIA SIBIRICA, Don., non DC. Small form, exactly the *Pulmonaria ciliata*, Torr. Dr. Parry, as before (285), collected large forms, and now some with the leaves more glaucescent beneath. 443. MERTENSIA ALPINA, Don. *Pulmonaria alpina*, Torr. Barely a span high. 444. A very dwarf and hirsute form of the last, the sepals strikingly ciliate with long hirsute hairs, from South Park. These two numbers, and additional still dwarfer specimens of Parry's No. 286, induce me now to refer the latter (along with *M. Drummondii*) to *M. alpina*. 445. M. ALPINA, Don., var.; the loosely paniculate, small-flowered form, Dr. Parry's 284, mixed in my set with M. FENDLERI, Gray, Rev. Mertens., in Suppl. Enum. Pl. Parry, p. 46 (339); the latter, perhaps, runs into the former, but it is readily known by the barely 5-cleft calyx; the lobes only equalling or shorter than the tube.

HYDROPHYLLACEÆ.

439. PHACELIA CIRCINATA, Jacq. 446. P. POPEI, Torr. and Gray. "Flowers white." 447. P. (EUTOCA) SERICEA, Gray.

POLEMONIACEÆ.

448. POLEMONIUM CÆRULEUM, L. A very viscid-pubescent and glandular variety; same as Parry's 275, and, (except that the stem is very leafy to the top,) Geyer's 530, and Fendler's 645. "Low and middle elevations." 449. P. CÆRULEUM, L., answering to the plant of the Old World, except that the seeds are more or less wing-margined at each end; so it is the var.? *pterosperma*, Benth. in DC. "Subalpine, in swampy places." 450, 451. P. CONFERTUM, n. sp.* *P. pulcherrimum* in Enum. Pl. Parry, No. 274, but not of Hook. "High alpine, and at lower elevations." 452. P. PULCHELLUM, Bunge; just the Altai plant; and also accords with some of Hooker's speci-

* POLEMONIUM CONFERTUM (sp. nov.): humile (3–9-pollicare) pl. m. viscoso glandulosum, odorem moschatum redolens: foliolis numerosissimis parvis (1½–5 lin. longis) ovalibus seu lineari-oblongis plerisque irregulariter *verticillato seu fasciculato-confertis* (*nempe singulis 2-3-sectis*); floribus ad apicem caulis simplicis capitato-confertis nutantibus; calycis segmentis lanceolatis acutis tubo oblongo brevioribus: *corolla infundibuliformi* (sæpius pollicari) calycem bis terve superante, lobis rotundatis tubo 2-5-plo brevioribus. Var. α. (*P. pulcherrimum*, Gray, Enum. Pl. Parry, non Hook.); capitulo florum denso, fructifero arcte spicato; corollæ læte cæruleæ limbo amplo. Hall and Harbour coll. 450; strictly alpine. Var. β. MELLITUM: floribus in spicam laxiorem foliosum digestis nunc subpaniculatis odorem mellis spirantibus; corolla aut cærulea aut sæpius ochroleuca, lobis minoribus tubo productiore 3–4-plo brevioribus. In crevices of rocks, wholly below the alpine region. Leaves exaling the musky odor of var. α; the flowers with a delicious honey-like fragrance. Hall and Harbour, coll. 451. In the present condition of the species of *Polemonium*, I could not venture to add another to the list, if the present were not shown, by the fine suite of specimens now collected, to be a most distinct one. It is probably (at least in the var. α) the very handsomest of the genus; and, as ripe seeds were collected, it may be brought into cultivation. I cannot doubt that the two varieties are of one species. The ampler limb of the corolla of var. α (when fully expanded sometimes ten or eleven lines in diameter,) often renders the funnel-form tube less conspicuous; but this form passes by gradations into those of var. β, in which the narrow tube of the corolla (9 or 10 lines long) three or four times exceeds the smaller lobes. Indeed, this connects *Polemonium* as closely with *Ipomopsis* as the latter is connected with true *Gilia*. A high alpine form of var. α was collected by Dr. Lyall in the Rocky Mountains further north, lat. 49°, at the height of 8000 feet, having the verticillate leaflets of the species, but a less exserted corolla. It was taken for *P. viscosum*, Nutt.; but the minute leaflets of the latter are not verticillate or fascicled, although much crowded, and its calyx and corolla are quite different, allying it to *P. pulchellum*. I make small account of the ovules, finding them to vary widely in number in different flowers of the same inflorescence; but in var. α, I have counted a dozen in each cell, in var. β, usually only 4 to 6. The anthers are more oblong than in *P. cæruleum*. Beware of the change of shape which the effete anthers undergo: when dry, they are short-oval, when soaked they become elongated-oblong, as *P. Richardsonii* is figured in Bot. Mag. In like manner those of *P. cæruleum* change from rotund to short-oblong.

mens of *P. pulcherrimum;* both of which, with *P. capitatum*, etc., do seem to pass into Arctic forms of *P. cæruleum*. 453. PHLOX DOUGLASII, Hook. 454. P. HUMILIS, Dougl.? 455. P. HOODII, Richardson. 403. COLLOMIA GRACILIS, Dougl. 404. C. LINEARIS, Nutt. 456. GILIA PINNATIFIDA, Nutt. ined. 457. G. INCONSPICUA, Dougl. 458. G. LONGIFLORA, Benth. (*Cantua longiflora*, Torr.) 459. G. AGGREGATA, Spreng. (*G. pulchella*, Dougl.) With white as well as red flowers. 460. G. SPICATA, Nutt., in Pl. Gamb. The same as 271 of Parry's collection. 461. G. CONGESTA, Hook, var.? with the leaves mostly entire. "Alpine." (462. *Chamærhodos erecta*. See Rosaceæ.) 463. GILIA (LEPTODACTYLON) PUNGENS, Benth., from which *G. Hookeri* scarcely if at all differs.

CONVOLVULACEÆ.

464. CUSCUTA ARVENSIS, Beyrich, var. *pentagona*, Engelm., a form with a small calyx. 579. EVOLVULUS ARGENTEUS, Pursh.

SOLANACEÆ.

465. SOLANUM ROSTRATUM, Dun. 466. PHYSALIS LOBATA, Torr., a form with the leaves little lobed; the corolla purple or blue. 467. SOLANUM TRIFLORUM, Nutt.

GENTIANACEÆ.

468, 469. GENTIANA AFFINIS, Griseb.;* the former a more condensed form; the latter is 439 of Parry's separate collection. "Common in the subalpine region." 470. G. PARRYI, Engelm.†, a form with narrower leaves than Dr. Parry's specimens of the preceding year. "Subalpine." 471. G. DETONSA, Griseb., which Dr. Engelmann, with reason, reduces to a variety of *G. crinita*.‡ 472. G. FRIGIDA, Hænke, var. *algida*, Griseb.: most beautiful specimens of Parry's 305, so new to this country. 473. G. ACUTA, Michx.; in various forms; perhaps in some sets with a little of the too nearly related *G. tenuis*.§ 474. G. HUMILIS, Stev. 475. G. PROSTRATA, var. *Americana*, Engelm. 476. SWERTIA PERENNIS, L. 477. PLEUROGYNE ROTATA, Griseb.‖ "South Park, subalpine." 553. FRASERA SPECIOSA, Dougl.

ASCLEPIADEÆ.

478. ASCLEPIAS BRACHYSTEPHANA, Torr.; a dwarf form of this rare species, collected on the plains. 479. A. SPECIOSA, Torr. (*A. Douglasii*, Hook.)

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* GENTIANA AFFINIS, Gris. *genuina:* caule virescente; bracteis calycem fere æquantibus; calycis lobis inæqualibus tubum longiorem integrum seu varius spathaceo-fissum subæquantibus; corolla anguste clavata pallide cœrulescente.

GENTIANA AFFINIS, var. *brachycalyx:* caule purpurascente; bracteis florum superiorum brevissimis; calycis tubo abbreviato truncato seu brevissime dentato lobatove; corolla majore subventricosa azurea.

This form has the appearance of a distinct species, but the characters taken from the calyx are variable; besides, Dr. Parry has sent specimens of it with a more distinctly lobed calyx. Other specimens collected by Mr. H. Engelmann, on Sweet Water River, have either an entire or a semispathaceous calyx, with lobes of different proportions; his specimens show many ascending stems growing from a large root, with numerous yellowish fleshy fibres.—*G. Engelmann.*

† GENTIANA PARRYI, Eng., a narrow-leaved form. Dr. Parry informs me that the narrow-leaved varieties are often one-flowered, and their stems single, while the broader-leaved form (coll. Parry, 1861, No. 304) usually occurs in bunches; the boat-shaped bracts, the small calyx lobes, and the bifid folds of the corolla are never wanting, and distinguish it readily from the allied *G. calycosa*.—*G. E.*

‡ GENTIANA BARBELLATA, Engelm. in Trans. Acad. St. Louis, 2, t. 11 (ined.). is Dr. Parry's 440, a truly alpine, dwarf and very beautiful species, closely related to *G. crinita, ciliata*, &c.

§ On examination of a series of specimens, Dr. Engelmann is inclined to view *G. tenuis*, Griseb. as an extreme form of *G. acuta*, and also to adopt the conclusions of those who regard the latter as specifically identical with *G. Amarella* of the Old World. He adds the following note.

GENTIANA ACUTA, Michx. Undoubtedly an American subspecies of *G. Amarella*. Messrs. Hall and Harbour have sent a large suite of specimens, which, together with Dr. Parry's (1861, Nos. 307 and 309), show an extreme variability in size, manner of branching and arrangement of flowers, shape and size of leaves, proportion of calyx, size and color of corolla and size of seeds.—*G. Engelmann.*

‖ Dr. Engelmann remarks upon this, 1st. That the ovules cover the whole surface of the ovarian cavity; 2d. That the structure of the corolla is that of *Swertia*, the nectarian glands at the base of the segments of the corolla being surrounded by a petaloid funnel with fringed edges; so that the curious lateral stigma principally separates the genus from *Swertia*.

"On low mountains." 480. A. OVALIFOLIA, Decaisne, Gray, Man., 1862, var. 481. A. VERTICILLATA, L., a common dwarf variety of the region, only three or four inches high.

NYCTAGINACEÆ.

482. OXYBAPHUS ANGUSTIFOLIUS, Sweet; the same as Fendler's 745. 483. O. NYCTAGINEUS, Sweet, with the upper leaves nearly sessile; both glabrous and hirsute forms. 572. ABRONIA FRAGRANS, Nutt. 573. A. CYCLOPTERA, Gray.

CHENOPODIACEÆ.

484. OBIONE ARGENTEA, Moq. The same as 574 of Wright, and 708 of Fendler. 485. CHENOPODIUM HYBRIDUM, L. "Low mountains; rare." 486. MONOLEPIS NUTTALLIANA, Moq. (487. See Amarantaceæ.) 488. CHENOPODINA DEPRESSA, perhaps also *C. prostrata*, Moq. "South Park, and on the plains." The root is annual. 489. C. MARITIMA, var. *erecta*, Moq. 308. OBIONE CANESCENS, Moq.

AMARANTACEÆ.

487. FRŒLICHIA (OPLOTHECA, Nutt.) FLORIDANA, Moq. "Sand hills, on the plains."*

POLYGONACEÆ.

490. POLYGONUM BISTORTA, L., var. *oblongifolium*, Meisn. 491. P. VIVIPARUM, L. 492. P. TENUE, Michx., in several varieties, one of them (Parry's No. 322*a* of 1862) from the alpine region, only two or three inches high, with oblong or oblong-lanceolate leaves, appears to be to *P. tenue* what *P. aviculare*, var. *nanum*, Boiss., is to the ordinary *P. aviculare*.† 493. P. COARCTATUM, Dougl., var. *minus*, Meisn.; a depauperate form? "Blue River, on the western slope of the Rocky Mountains." 494. OXYRIA DIGYNA, R. Br. 495. RUMEX VENOSUS, Pursh. 496, 498. R. SALICIFOLIUS, Weinm. 497. R. MARITIMUS, L. "Subalpine, and on the plains of Nebraska." 499. R. LONGIFOLIUS, DC. (*R. Hippolapathum* and *R. domesticus*, Fries. Extends into the mountains; very common. 500. ERIOGONUM ALATUM, Torr. 501. E. ANNUUM, Nutt. 502. E. EFFUSUM, Nutt., with rose-colored flowers. 503. E. CERNUUM, Nutt. 504. E. UMBELLATUM, Torr., both with straw-colored (Parry's 318,) and with deep yellow flowers (Parry's 315). 505. E. FLAVUM, Nutt., a low form from the alpine region, and a large variety (var. *crassifolium*, Benth.) from a less elevated region.

ELÆAGNACEÆ.

506. SHEPHERDIA CANADENSIS, Nutt. "Subalpine pine woods."

SANTALACEÆ.

507. COMANDRA PALLIDA, var. *angustifolia*, A. DC. *C. angustifolia*, Nutt., ined.

LORANTHACEÆ.

574. ARCEUTHOBIUM CAMPYLOPODUM, Engelm. Probably only *A. Americanum*, Nutt.

EUPHORBIACEÆ.

508. EUPHORBIA MARGINATA, Pursh. 509, (also 438 of Parry) E. MONTANA, Engelm. 510. E. DICTYOSPERMA, Fisch. and Mey. 511. E. HEXAGONA, Nutt.

* On the plains, in similar situations, Mr. Hall collected *Amblogyne* (*Surratia*) *Torreyi*, Gray, in Proceed. Amer. Acad., 5, p. 169, the narrow form, noted in H. Engelmann's collection. Parry's No. 323, referred doubtfully to *Montelia*, is probably the male of this.

† Dr. Engelmann, in a letter, referring all the forms of No. 492 to *P. tenue*, arranges them as follows:—"Var. *α.* COMMUNE: majus; nucibus majoribus (sesquilineam longis). *β.* MICROSPERMUM: minus, gracilius; nucibus vix lineam longis. *γ.* LATIFOLIUM; humile; foliis oblongis; spicis coarctatis; bracteis superioribus (aristo destitutis) muticis. Meisner, in the Prodromus, is wrong in saying that the nuts are subopaque or rough on the edge; they are perfectly smooth and shining with concave sides and an acumination."

512. E. PETALOIDEA, Engelm., with the small-flowered form named *E. polyclada* by Boissier. 513. E. FENDLERI, Torr. and Gray; the inappendiculate form. 514. CROTON (HENDECANDRA) MURICATUM, Nutt. 309. TRAGIA RAMOSA, Torr.

CUPULIFERÆ.

515. QUERCUS DOUGLASII, var. *Neo-Mexicana*, A. DC. 516. CORYLUS ROSTRATA, Ait.

BETULACEÆ.

517. BETULA GLANDULOSA, Michx. "Subalpine." 518. B. PAPYRACEA, Michx., var., called *B. alba*, var. *glutinosa* in Parry's Enumeration. 519. ALNUS VIRIDIS, Ait.

SALICACEÆ.

520. SALIX ARCTICA, R. Br. 521. S. RETICULATA, L. This and the last are high alpine species. 522. S. ROSTRATA, Richards. (*S. vagans*, Anders.) 523. S. GLAUCA, L. "Subalpine." 524. S. CORDATA, Muhl., or VITELLINA, L. 525. POPULUS ANGUSTIFOLIA, Torr. "Foot of the mountains." 526. P. BALSAMIFERA, L., var. *candicans*. "Subalpine; rather rare." 527. P. TREMULOIDES, Michx.

CONIFERÆ.

528. PINUS PONDEROSA, Dougl.; Engelm. in Enum. Pl. Parry, Suppl., p. (39) 332. 529. P. FLEXILIS, James; Engelm., l. c. 530. P. ARISTATA, Engelm. l. c. 531. P. CONTORTA, Dougl.; Engelm., l. c. 532. P. EDULIS, Engelm. 533. ABIES MENZIESII, Lindl. 534. A. DOUGLASII, Lindl.

ORCHIDACEÆ.

535. PLATANTHERA HYPERBOREA, Lindl. 536. P. OBTUSATA, Lindl. 537. CALYPSO BOREALIS, Salisb. 538. CYPRIPEDIUM PARVIFLORUM, Salisb. 539. SPIRANTHES GEMMIPARA, Lindl., from South Park, in the Rocky Mountains, (and one or two specimens were collected by Dr. Parry on South Clear Creek, July, No. 441);—quite resembling the Irish plant in aspect and in the labellum, etc., but the sepals rather narrower and less blunt,—mixed (in my set) with taller specimens, from the plains, of a narrow-leaved form of S. CERNUA, having very large nipple-shaped calli on the base of the labellum. The labellum of the former, when flattened out, is in outline ovate or ovate-oblong, with a narrowed subapical portion below the cordate-rotund erose-crisped summit. The forms of *S. cernua*, or the species allied to it, are thus far quite inextricable. The present Rocky Mountain specimens are exceedingly interesting, whether absolutely identical or not with the much-vexed and isolated *S. gemmipara*. They have not the long-acuminate bracts of *S. Romanzoviana*, of which my specimens are too young to allow a comparison of the flowers.

ALISMACEÆ.

540. TRIGLOCHIN PALUSTRE, L. 541. T. MARITIMUM, L. Both from the mountains.

IRIDACEÆ.

542. IRIS TENAX, Dougl.? "Subalpine, and at lower elevations; common." This, now collected in flower, we had in fruit, collected on the Laramie Mountains by Dr. Hayden, and at Bridger's Pass by Mr. H. Engelmann. The spathe is more scarious and the capsules larger than in *I. tenax*.

LILIACEÆ, incl. SMILACEÆ, MELANTHACEÆ, etc.

543. STREPTOPUS AMPLEXIFOLIUS, DC. 544. SMILACINA STELLATA, Desf. 545. ALLIUM STELLATUM, Fraser. 546. A. SCHŒNOPRASUM, L. 547. A. CERNUUM, Roth. 548. LEUCOCRINUM MONTANUM, Nutt. 549. CALOCHORTUS VENUS-

TUS, Benth. ex Torr. 550. ZYGADENUS GLAUCUS, Nutt. 551. AMIANTHIUM NUTTALLII, Gray. 552. LLOYDIA SEROTINA, Reich. "Pike's Peak, in the alpine region." (553. See Gentianaceæ.)

JUNCACEÆ.

554. LUZULA SPICATA, DC., var. near *L. Peruviana;* the same as 392 of Dr. Parry. 555. L. PARVIFLORA, DC. 556. L. COMOSA, E. Meyer (with a little *L. campestris*). 557. JUNCUS TRIGLUMIS, L. 558. J. ARTICULATUS, L., var. *pelocarpus*, Gray, Man. 559. J. BUFONIUS, L. "Subalpine." 560. J. CASTANEUS, Sm., an alpine form, the same as Parry's 358. 561, 562. J. ARCTICUS, Willd., var. *gracilis*, Hook. ? Alpine and subalpine. The same as Parry's 360. It appears like a depauperate and attenuated form of *J. arcticus;* but as most of the cauline sheaths are leaf-bearing, it is probably of a distinct species, so far as I know, yet undescribed. Dr. Lyall collected it, as well as the true *J. arcticus*, in the Cascade Mountains, farther north. 563. J. ARCTICUS, Willd., proper, with leafless sheaths and more less attenuated stems. 564. J. XIPHIOIDES, E. Meyer. Well marked by its flattened stems as well as leaves. It was also collected in this region by Fendler (858), H. Engelmann, and in the Rocky Mountains, farther north, by Bourgeau. 565. J. ENSIFOLIUS, Wikstr. This has "terete flaccid culms." 566. J. MENZIESII, R. Br.; the same as Parry's 361 so named, Fendler's 857, Wright's 1924, and Coulter's 808, the var. *Californicus*, Hook. and Arn. Probably an unpublished species. 567. J. BALTICUS, Willd.

568—580. Various Dicotyledonous plants, enumerated above under their respective orders.

CYPERACEÆ.

581. FIMBRISTYLIS LAXA, Vahl. 582. SCIRPUS PAUCIFLORUS, Lightf., which Drummond had formerly collected in the Rocky Mountains, and which has been detected at several points along the northern frontier of the United States. 583. S. CÆSPITOSUS, L. Also subalpine. 584. CYPERUS SCHWEINITZII, Torr. "Low mountains, lat. 39°."

585—620. *Carices* here given from the determination and notes of Dr. Boott:—

585. CAREX ATRATA, L. (OVATA): spicis 3 oblongis (inferioribus pedunculatis parce masculis) atro-purpureis; perigyniis floriferis glauco-viridibus. 586. C. ATRATA: spicis contiguis ovatis crassis, inferiori subsessili; perigyniis floriferis margine viridibus squamis atropurpureis demum ferrugineis subæquilongis. Vide Parry, 389. 577. C. ATRATA (NIGRA): spicis subrotundis congestis vel infima discreta sessilibus; perigyniis ovalibus vel ellipticis cylindrico-rostratis superne præcipue ad margines rostri dentatis; stig. 2–3. Gracilior, altior quam pl. Helvetica rostroque longiore, perigyniis pallidis. Eadem ac Parry, 383. 588. C. ATRATA, L. and C. RIGIDA, Good., mixed. 589. CAREX FESTIVA, Dewey. 590. C. FESTIVA, Dewey; young.

591. CAREX BONPLANDII, Kunth. ? var. *minor:* perigyniis rarissime ad margines scabris. See Couthouy's specimens from the Andes of Quito.

592. CAREX MURICATA, L. ? with smaller perigynia, like Fendler's No. 884, in part. 593. C. SICCATA, Dewey. 594. C. DISTICHA, Huds. (*C. Sartwellii*, Dewey.) 595. C. GAYANA, Desv., Boott, Ill., t. 411. 596. C. DEWEYANA Schw. 597. C. STENOPHYLLA, Wahl.

598, 599. KOBRESIA SCIRPINA, Willd., or perhaps with some K. CARICINA, Willd.

600. CAREX DOUGLASII, Boott. Here, as in all other collections, in flower only. 601. C. TENELLA, Schk. 602. C. CANESCENS, L. 603. C. POLYTRICHOIDES, Muhl.

604. CAREX FILIFOLIA, Nutt., var. culmo validiori; perigyniis plano-triquetris glabris margine serrulatis; squamis minus late scariosis; rhacheola ut in

forma typica. 605. C. FILIFOLIA, Nutt.; the ordinary form. [Parry's 442 is a high alpine form of the same species.]

606. CAREX OBTUSATA, Lil. 607. C. PAUCIFLORA, Lightf. 608. C. PYRENAICA, Wahl. 609. C. NIGRICANS, C. A. Meyer. 610. C. SCIRPOIDEA, Michx. 611. C. GEYERI, Boott. 612. C. BACKII, Boott. 613. C. CAPILLARIS, L.

614. CAREX LONGIROSTRIS, Torr., var. *minor;* culmo brevi; spicis abbreviatis; rostro breviore. 615. C. AMPULLACEA, L. (*utriculata*, Boott.) 616. C. JAMESII, Torr. and C. ANGUSTATA, Boott, mixed. 617. C. PARRYANA, Dewey. Some specimens have two spikes, the terminal masculine; others have either one or two spikes, both wholly feminine. 618. C. ALPINA, Sm. (*Vahlii*, Schk.) 619. C. BUXBAUMII, Wahl. 620. C. ROSSII, Boott.

GRAMINEÆ.*

621. An ambiguous and undetermined Grass, between *Festuca* and *Melica*. 622. DANTHONIA SERICEA, Nutt. [*D. unispicata*, Munro, ined., is a reduced form of this, to which belongs Geyer's No. 189.] 623. AVENA STRIATA, Michx. 624. CALAMAGROSTIS SYLVATICA, DC. 625. TRISETUM SUBSPICATUM, Beauv., with a remarkable open-panicled form. 626. STIPA VIRIDULA, Trin., the *S. parviflora*, Nutt. 627. AIRA CÆSPITOSA, L., two forms; the smaller and more alpine of which is the var. *arctica* (*Deschampsia brevifolia*, R. Br.); the larger is intermediate between that and the ordinary form of the species. Parry's 367 of 1862 connects the two.

628. HIEROCHLOA BOREALIS, R. and S. 629. GLYCERIA AQUATICA, Smith. 630. G. (HELEOCHLOA) AIROIDES, Thurb., the *Poa airoides*, Nutt.

631. VILFA TRICHOLEPIS, Torr.; a remarkable species, which it may be necessary upon further study to remove from the genus. 632. MUHLENBERGIA PUNGENS, n. sp.† 633. ERIOCOMA CUSPIDATA, Nutt. 634. ORYZOPSIS MICRANTHA; *Urachne micrantha*, Trin. A very distinct species, differing from *O. Canadensis*, Torr., in its elongated panicle, smaller spikelets, glabrous paleæ, and much longer awn. 635. GRAPHEPHORUM? FLEXUOSUM, n. sp.‡ 636. BOUTELOUA OLIGOSTACHYA Torr. 637. BUCHLŒ DACTYLOIDES, Engelm. *leria*, Nutt.); the staminate plant only. 638. MUNROA SQUARROSA, Torr. 639. SPARTINA GRACILIS, Trin.; the name wrongly attributed to Hooker by Steudel; it is S. JUNCIFORMIS, Engelm. and Gray, Pl. Lindl. 1, No. 207. 640. BRIZOPYRUM SPICATUM, Hook, var. *strictum*.

641. SPOROBOLUS ASPERIFOLIUS, Nees and Meyen. 642. MUHLENBERGIA GRACILLIMA, Torr. 643. SPOROBOLUS RAMULOSUS, HBK. 644. LEPTOCHLOA FASCICULARIS, Gray; a remarkable and large form; which has been by seve-

* By *Prof. George Thurber*. On account of illness, Prof. Thurber has been prevented from studying these Grasses as thoroughly as could be wished. A more critical account of some of them may be expected hereaftor.

† MUHLENBERGIA PUNGENS (Thurber, sp. nov.): culmo e rhizomate repente 1–1½-pedali foliisque rigidis convolutis pungentibus patentibus (1–1½ poll. longis haud lineam latis) minute pubescentibus, ligula brevi ciliata; paniculæ 3–4-pollicaris radiis solitariis dissitis basi nudis fasciculatim ramosis; pedicellis capillaribus scabris spiculis (cum arista 2½ lin. longis) pluries longioribus; glumis fere æqualibus acuminatis vel seta apiculatis flore dimidio brevioribus; callo nudo rudimento minimo prædito; palea inferiori scabra acuta in aristam asperam semi-vel sublineam longam producta, superiori subæquilonga, nervis excurrentibus bisetiferis; staminibus 3.—A striking species, with very pale green foliage, and a purplish paniclo. Collected also by Mr. H. Engelmann in Nebraska, and by Dr. J. S. Newberry in Ives' Colorado Expedition.

‡ GRAPHEPHORUM? FLEXUOSUM (Thurber, sp. nov.): culmo tripedali lævi; vaginis internodia superantibus annulo pilorum pro ligula instructis; foliis sesquipedalibus 2 lin. latis setaceo-acuminatis; panicula laxiflora, radiis sparsis (infimis distantibus circ. 4 poll. longis) inferne nudis in ramulos pancos capillares solutis; pedicellis spiculis ovatis compressis 3–6-floris) 2½–3 lin. longis) duplo vel quadruplo longioribus; glumis membranaceis uninerviis acutis spicula dimidio brevioribus; palea inferiori carinata trinervi (nervis lateralibus prominontibus) scabro-pubescente apice eroso-denticulata cum mucrone basi villifera, superiori subæquilonga eximie bicarinata bidentata. Stam. 3. Ovarium stipitatum. Squamulæ 2, oblique truncatæ. Caryopsis libera. Dr. J. M. Bigelow collected this Grass several years ago on the Canadian River. It is doubtfully referred to *Graphephorum* as that genus is defined by Dr. Gray in the Proceedings of the Botanical Society of Canada. But the joints of the rhachis are very short, and the tuft of hairs seems rather to belong to the palea.

ral western collectors, but I am unable to distinguish it specifically from the plant of the Atlantic States. 645. TRICUSPIS PURPUREA, Gray. 646. STIPA MONGOLICA, Turcz. (*Ptilagrostis Mongolica*, Griseb. in Ledeb., Fl. Ross.) I have no specimen by which to confirm this determination, but it accords so well with the description, except as to size, as to leave little doubt.* This makes the third species with a plumose awn found in our territory.

647. SPOROBOLUS AIROIDES, Torr. 648. S. CRYPTANDRUS, Gray, same as 945 of Fendler. 649. CALAMAGROSTIS STRICTA, Trin., with some C. SYLVATICA intermixed. 650. KŒLERIA CRISTATA, Pers., a very attenuated form. 651. ANDROPOGON ARGENTEUS, DC. (*A. Jamesii* and *A. glaucus*, Torr.) 652. ARISTIDA PURPUREA, Nutt.; the form called *A. Fendleriana* by Steudel. 653. PASPALUM SETACEUM, Michx.

654. ELYMUS near CONDENSATUS, Presl. and apparently E. TRITICOIDES, Nutt., mixed. 655. TRITICUM REPENS, L., var. [656. T. CANINUM, L. var., the same as Parry's 381, named *T. ægilopoides* in the coll. of 1861, but wrongly: along with attenuated T. REPENS, L. 657. T. ÆGILOPOIDES, Turcz., *A. gropyrum divergens*, Nees.]

658. BECKMANNIA ERUCÆFORMIS, Host. 659. SPOROBOLUS AIROIDES, Torr. 660. VILFA DEPAUPERATA, Torr. This was described from an extremely reduced form of a very variable species, of which *V. utilis*, Torr., is an attenuated state. 661. V. CUSPIDATA, Torr. Like others of the genus, this presents great differences in the relative length of the glumes and paleæ.

662. GLYCERIA PAUCIFLORA, Presl. 663. CATABROSA AQUATICA, Beauv. 664. MUHLENBERGIA GRACILIS, Trin. 665. FESTUCA OVINA, L., var. *duriuscula*, Gray. 666. F. RUBRA, L.; very young. 667. F. SCABRELLA, Torr.? Perhaps a very narrow-leaved form of this species, of which specimens collected by Dr. Bigelow in New Mexico are the opposite extreme.

668. POA near P. NEMORALIS, L. It is 375 of Parry. 669. P. ANDINA, Nutt. in herb. Acad. The Poas of this collection, including some undistributed specimens, present several puzzling forms, which can be accurately determined only by a much more thorough study than can be given them at present. 670. P. ARCTICA, R. Br., (Parry's 376,) mixed with some of *P. alpina*.

671. AGROSTIS VARIANS, Trin. Agrees well with Hooker's No. 217, quoted by Trinius, but some specimens have a strong awn. 672. POA SEROTINA, Ehrh. 673. AGROSTIS near RUPESTRIS. 674. POA ALPINA, L., mixed with one which may be a variety of it. [675. POA, near 669 and 677.] 676. P. ARCTICA, R. Br.? 677. P. ANDINA, Nutt. 678. POA, undetermined species.

679. SITANION ELYMOIDES, Raf. Two forms of this variable grass, which will probably be reduced to *Elymus*. 680. TRITICIUM CANINUM, L., var. same as 381 of Parry. 681. HORDEUM JUBATUM, L. 682. ALOPECURUS PRATENSIS, var. ALPESTRIS, Wahl. (*A. glaucus*, Less.) ex Gray. 683. A. GENICULATUS, var. ARISTULATUS, Michx. 686. LEPTANS PANICULATUS, Nutt. 685. VASEYA COMATA, n. gen. and sp. This remarkable grass, which really appears to form a new genus, intermediate between the Arundinaceæ and the Agrostideæ, is dedicated (by the collectors' desire, seconded by Dr. Gray) to Dr. George Vasey, of Ringwood, Illinois, one of the most zealous of our Western botanists. The following are its principal characters:

VASEYA, nov. gen.

Panicula coarctata. Spiculæ unifloræ, herbaceo-membranaceæ. Glumæ uninerves florem adæquantes. Callus obliquus, comam pilorum paleis æquilongam gerens. Palea inferior trinervis in aristam gracilem attenuata; superior æquilonga, acuminata. Stamina 3. Ovarium stipitatum. Styli ultra medium pilis stigmaticis longis simplicissimis instructi. Squamulæ . . . Caryopris . . . . V. COMATA, a native of the plains of Nebraska; is a

*A comparison with an authentic but imperfect Mongolian specimen confirms Prof. Thurber's determination.—*A. G.*

perennial grass, with the aspect of a *Muhlenbergia* or of a *Polypogon*, but with a coma of silky hairs around the flower, as in a *Calamagrostis*. Culm a foot and a half high, from a creeping rhizoma, retrorsely pubescent at the nodes. Sheaths scabrous, equalling the internodes; ligule short, fringed; leaves 3 or 4 inches long, dull green, rough on both sides. Panicle lead-colored, about 3 inches long; the branches solitary, appressed, densely many-flowered. Spikelets very short-pedicelled, compressed, pubescent, a line and a half long. Glumes narrow, very acute, serrulate on the keel, the lower a little the longer. Awn rough and flexuose, purplish, three or four lines long.—*G. Thurber.*

FILICES.

687. Aspidium Filix-mas, Swartz.; apparently identical with the European plant. 688. Cryptogramme acrostichoides, R. Br., by Sir Wm. Hooker regarded as a variety of *Allosorus crispus*. 689. Asplenium septentrionale, L. This was collected by C. Wright farther south; and these two stations are the only known American ones. 690. Cystopteris fragilis, Bernh., mixed with a Woodsia, the same as Parry's 394, formerly named *W. obtusa;* but it is of a different species. 691. Cheilanthes Fendleri, Hook. 692. Asplenium Trichomanes, L. 693. Nothochlæna Fendleri, Kunze, Filices, 2, p. 87, t. 136; the same as Parry's 396. A species recently distinguished from *N. dealbata*. 694. Polypodium vulgare, L. 695. P. Dryopteris, L.

Catalogue of the FISHES of Lower California, in the Smithsonian Institution, Collected by Mr. J. Xantus.

BY THEODORE GILL.

PART IV.

Subfamily *SERRANINÆ* (Swainson.)

Nine genera of this subfamily are now known to be represented by species along the western coast of America and the Gallapagos Islands. They may be thus distinguished:—

I. Caudal with the lobes acuminate.
  Lateral line before superior, deflected behind..... Pronotogrammus.
  Lateral line normal..... Brachyrhinus.
II. Caudal not forked.
  A. Canine teeth developed.
    B. Dorsal spines XI.
      C Nostrils in a vertical row..... Mycteroperca.
      CC. Nostrils in a longitudinal row.
        Body oblong; smooth above lateral line..... Labroperca.
        Body oval, with ctenoid scales..... Epinephelus.
    BB. Dorsal emarginated; spines X.
      C. Head with profile decurved, scaly above..... Paralabrax.
      CC. Head conic; naked between eyes.
        Spinous dorsal rounded..... Atractoperca.
        Spinous dorsal, incurved behind the third elongated spine..... Gonioperca.
  AA. Canine teeth entirely obsolete ..... Dermatolepis.

The preceding table gives only the more striking characters; those are accompanied by others, which appear to amply authorize their generic distinction. In the table, the genera do not follow each other in a strictly natural order.

Genus PRONOTOGRAMMUS Gill.

This genus has the form of *Brachyrhinus*. The body is covered by moderate,

[Mar.

ctenoid scales. The lateral line runs high on the sides for the greater part of its length, but is abruptly deflected behind, and thence continued along the middle of the caudal peduncle. The head most resembles that of *Brachyrhinus*. The preoperculum is serrated on its posterior margin, and has a strong compressed spine at its angle. The operculum has three acute angles, the middle continued from an internal rib. The teeth are like those of *Serranus*, &c.; two large ones exist on each side of the front, in the margin of the upper jaw, and one on each side, near the symphysis in the lower; while there are also two on the sides. The vomer and palatine bones have villiform teeth. There are, apparently, only six branchiostegal rays. The dorsal is undulated, and has ten spines. The anal has three strong spines, the second of which is largest. The lobes of the caudal are acute; the pectorals acutely rounded; and the ventrals angulated.

PRONOTOGRAMMUS MULTIFASCIATUS Gill.

The greatest height equals or slightly exceeds a quarter of the length from the snout to the end of the median caudal rays. The head equals a third of that length, and contains the diameter of the eye,—which is oval,—three times. The snout is less than half the diameter of the eye. The spines of the dorsal rapidly increase to the fourth, which nearly equals a seventh of the length, and thence decrease to the last, which equals about an eleventh of the same. The longest ray about equals the longest spine. The second anal spine is more than twice as long as the first, equals the fourth dorsal one, and is considerably longer than the third anal one. The median caudal rays enter $6\frac{2}{3}$ times in the total length, while the longest exceed the greatest height. The pectoral fin commences little before the end of the first third of the length, (·32,) and equals a quarter of that length. The ventral is inserted considerably in advance of the pectoral, (·28,) and is rather shorter than it.

D. X. 15. A. III. $6\frac{1}{1}$ P. 1. 14. V. I. 5. C. 10. 1. 8. 7. 1. 9.

Scales $31+2+12\frac{3\ 5}{17\ 5}$

The latter is deflected on two scales. The color is tawny yellow, with numerous (·20) rufous bands descending nearly to the middle, and rather wider than the tawny intervals.

Only one specimen, whose extreme length was little more than two inches, was obtained.

Family *CHILODIPTEROIDÆ* Bleeker.

Genus AMIA Gronovius.

The *Monoprion* of Poey is perfectly congeneric with the type of the genus *Amia;* the genus *Apogonichthys* of Bleeker appears to be at least very closely related to it, while both genera include forms that do not appear to be strictly allied, but more distinct from the types of the respective genera than the latter are from each other. The species of the old genus may be divided as follows:

I. Preoperculum serrated.
  Anal II. 7—9 (—10).
    Scales 20—28 $\frac{2—3}{5—8}$ ..... Amia.
    Scales 33—36 (*Apogon kalosoma*, Blkr.)..... Lepidamia.
  Anal II. 12—17 (*Apogon Bleekeri*, Gthr.)..... Archamia.

II. Preoperculum entire.

Scales $\frac{20—26}{5}$ ..... Apogonichthys.

Scales $\frac{40 —}{13}$ (*Apogon aprion*, Rich.)..... Glossamia.

As there is no gradation from one type to the other among the great number of species already known, the characteristics above given appear to be the indices of distinct genera. *Amia* and *Apogonichthys* are probably the most closely allied groups.

Family *SPAROIDÆ* (Cuv.)

Subfamily *XENICHTHYINÆ* Gill.

XENICHTHYS Gill.

Body moderately elongated and subfusiform, compressed, and with the caudal peduncle also compressed and robust. Scales deciduous, rather small, high and ctenoid. Lateral line tubular, in more conspicuous scales. Head compressed, conic, longer than high, with the occipito-rostral outline rectilinear. Upper surface of head to the nostrils covered with small scales. Occipital crest prominent. Eyes circular, large, and mostly in the anterior half of the head. Preorbital bones rather narrow and oblique. Operculum with two spines. Preoperculum pectinated behind, the teeth higher up progressively directed upwards.

Mouth rather small, with the lateral cleft very oblique, and not continued to eye; supramaxillary bones broad, enlarged in front below the intermaxillary, and behind the latter covered by a cutaneous flap from it. Lower jaw shorter than upper, but with the chin projecting beyond it, and with a pore on each side of the symphysis. Lower lip continuous and free at symphysis; plicated behind, where it is received under the upper jaw.

Teeth small, recurved, and in rather narrow bands on each jaw. Vomer with its projecting front provided with a villiform rhomboid patch; palatine bones and tongue edentulous.

Nostrils above anterior, and in a line with upper margin of orbit, near each other; the anterior circular: the posterior cleft transversely. Branchiostegal rays seven on each side.

Pseudobranchiæ present.

Dorsal fins connected by a low membrane at the base; the first with ten rather slender but perfectly rigid spines; the third, fourth and fifth of which are longest, (with no recumbent spine in front); the membrane has a fibrous appearance. Second dorsal lower than the first, and elongated. Anal fin about as long as second dorsal, but rather farther back, with three small, regularly increasing spines. Caudal fin emarginated, with rounded lobes.

Pectoral fins small, with the upper angle produced, but apparently rounded. Ventral fins inserted close behind the pectoral; each with a spine and five branched rays, and a pointed axillar scale.

As there might be some doubt as to the affinities of this genus, on account of the few palatal teeth and the number of branchiostegal rays, an extended description of its generic characters has been given. The spinous dorsal being received in a groove, the upper jaw closing under the preorbital bones and axillar ventral scales existing, it belongs to the family of Sparoids, as now modified. It cannot be referred to the Sciænoids, as its skull is smooth. The nearest allied genus appears then to be *Moronopsis*, (*Dules marginatus* C. V.*) That genus differs in its more compressed body, the scales and the similarity of those of the lateral line to the others, the stouter dorsal spines,

* The *Dules auriga* and *D. flaviventris* are, of course, not regarded as allied to *D. marginatus*, &c. I am unable to perceive any affinity between them, and they have been united only in accordance with an artificial system.

between which the membrane is acutely notched, the scaleless crown and little development of the occipital crest, the dentition and the number of branchiostegal rays, and, finally, the absence of axillar scales. With any other form it is unnecessary to compare the genus, as its natural affinities appear to be more intimate with *Moronopsis** than any other. Naturalists can decide from the above enumeration of the differential characters, in comparison with *Moronopsis*, if there is any other group to which it could be more naturally approximated. If it is stated that the physiognomy of the two genera is quite similar, the chief difference being caused by the procurrence of the occipital crest and the rectilinear profile, as well as the character of the scales, the ichthyologist can appreciate the aspect of the newly-described form.

Xenichthys xanti Gill.

The greatest height equals three-tenths of the length (*exclusive of the caudal*). The head forms a third of the same. The diameter of the eye equals a third of the head's length, is about a third greater than the interorbital area, and nearly a third greater than the length of the snout. The fourth or longest dorsal spine equals nearly a fifth of the total length, and is nearly five times longer than the tenth. The third or longest anal spine is scarcely more than a twelfth of the length. The pectoral fin at least exceeds a seventh of the length, while the ventral equals a seventh.

D. XII. 14. A. III. 17. C. 11. I. 8. 7. I. 9. P. 1. 15. V. I. 5.

Scales, lat. line 50.

The color is light; on each side of the back are two indistinct, purple, longitudinal bands; and before the dorsal fin is another. The color below is silvery. At the base of the caudal there is an indistinct spot. The tip of the spinous dorsal fin is dark.

This most interesting and even remarkable type is dedicated to Mr. John Xantus, to whom we are indebted for the noble collection of fishes and other animals of Lower California, and who has, more than any other single man, contributed to our knowledge of the natural history of the Western coast.

Family *CARANGOIDÆ*.

Genus ARGYRIOSUS Lac.

Two representatives of this genus are found on the Atlantic coast of the United States: they are the *A. vomer*, of Linnæus, and the *A. capillaris*, Dekay, the *A. unimaculatus* of Batchelder and Storer, and the form which has been considered by Günther as the young of *A. vomer* or a new species,—appears to me to be the young of *Vomer setipinnis*, and at least belongs to the same genus. The *Argyriosus Spixii* of Castelnau is the unfortunate *Selene argentea* of Lacépède, first well made known by Mr. Brevoort, but which has received a number of names from different writers.

Argyriosus Brevoortii Gill.

The greatest height in an oblique direction nearly equals nine-tenths (·87) of the length in a straight line, from the *vertical of the snout to the end of the median caudal* rays. The head forms less than a third of that length. The profile is oblique, and slightly incurved below the angular crown; its distance from the vertical of the snout equals an eleventh of the total length, and before the eyes, two-thirds of the preceding. The diameter of the orbit equals an eleventh of the length, and its distance from the profile equals two-thirds of the diameter. The height of the preorbital is twice as great as the diameter of the orbit. The base of the arched portion of the lateral line equals three-tenths of the total length, and its elevation above the horizon equals a

*The *Datnia? ambigua* of Richardson, which has been referred by Günther to the genus *Dules* differs from *Moronopsis* by the shorter convex anal fin, the large second anal spine, the small eyes and the entire physiognomy. It may be called *Plectroplites ambiguus*.

third of the base; the straight portion equals a third of the total length. The second dorsal spine is very long; the third little longer than the base of its fin. The caudal lobes diverge at nearly a right angle; the length of the lower nearly equals three-tenths of the total. The pectoral fin equals a quarter, and the ventral two-fifths of the total length.

D. VIII. I. 22. A. II. I. 18.

The color is silvery, punctulated, with black near the edge of the back, and with a black bar on the head above the eye, parallel with the forehead. The filamentous dorsal spines and the elongated dorsal and anal rays are blackish. The ventrals have the terminal half blackish, and the other whitish, with a median black band.

This species is distinguished by its proportions, oblique profile, lateral line and color. It may be further remarked that the branch of the lateral line ascending from the scapula divides into two branches, diverging at less than a right angle; the anterior branch appears to be a groove.

I have dedicated this species to my excellent friend, Mr. Brevoort, who has paid much attention to the group of fishes of which the present is a member.

Genus HALATRACTUS Gill.

Halatractus dorsalis Gill.

The greatest height equals a quarter of the length to the end of the median caudal rays. The head enters more than three times and a half (·28) in that length. The diameter of the eye equals a quarter of the head's length, and is shorter than the length of the snout (=·09). The median caudal rays forms an eleventh of the length, and the longest equal a fifth. The pectoral fin nearly equals a seventh (·13), and the ventral nearly a sixth (·16) of the length.

D. VII. I. 37. A. II. + I. 21. P. 2. 19.

The color is brassy, purplish on the back, and with ten indistinct darker bands, twice as wide as their intervals; the second between the second and fifth dorsal spines. The dorsal and anal fins are nearly black; the anterior angle of the latter lighter. The ventrals dusky, with the rays externally white.

This species is most nearly related to *Halatractus zonatus* Gill, and *H. caroliniensis*, Gill, of the Eastern American coast; but readily distinguished by the color and proportions.

Genus TRACHYNOTUS Lacépède.

Trachynotus Carolinus Gill.

This species is extremely variable, as are also the other well-known representatives of the genus. In extreme youth, the jaws and palate are dentigerous, and the *angle of the preoperculum armed with three radiating spines!* while the spinous dorsal and anal are elevated, and the angles of the soft fins scarcely produced. Later, the preopercular spines become obsolete; then the palatal teeth are lost; the spines of the fins meanwhile become abbreviated, and, finally, in old age, the teeth have entirely dropped out, the spines become much shortened, and the angle of the fins considerably produced. Half-grown specimens answer to the genus *Doliodon*, of Girard; nearly mature ones, with teeth in the jaws, *Trachynotus*, C.V.; and old ones, without teeth, to *Bothrolæmus*, Holbrook. Relying on the correctness of my predecessors, who had certainly the opportunities, if they had availed themselves of them, to avoid such errors, I adopted the several genera proposed by Holbrook and Girard in my Catalogue of the Fishes of the Eastern Coast; Günther first corrected the synonymy as lately given, and, under the other North American species, has brought together nine of Cuvier's species and two of other authors!

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The radial formula is also variable. Small specimens between one and two inches long exhibit the following variations:

1. D. V. + I. 26. A. II. + I. 24.
1. D. VI. + I. 26. A. II. + I. 24.
2. D. VI. + I. 26. A. II. + I. 23.
3. D. VI. + 1. 26. A. II. + I. 22.
1. D. VI. + 1. 25. A. II. + I. 23.
2. D. VI. + 1. 25. A. II. + I. 22.
1. D. VI. + 1. 24. A. II. + I. 21.
1. D. VI. + 1. 23. A. II. + I. 21.

TRACHYNOTUS RHODOPUS Gill.

The greatest height equals a third of the length from the snout to the end of the median caudal rays. The head forms scarcely more than a quarter of the length. The diameter of the eye exceeds a third of the head's length, and is a third greater than the length of the snout. The latter is as high as long, and truncated. The lower jaw is not received within the upper. The spinous dorsal from the third spine arched, and highest at its fifth spine, which equals an eighth of the length. The first two spines are short. The second anal spine equals a tenth of the total length. The median caudal rays form nearly a sixth of the length, and nearly equal two-thirds of the longest ones, or of the head. The pectoral fin is contained about five times and a half in the length.

D. VI. + I. 20. A. II. + I. 18, 19.

The color is bluish-silvery; the spinous portions of the dorsal and anal fins punctulated with black; the ventrals rose-colored; the other fins yellowish and mostly immaculate.

Numerous specimens of this species were obtained by Mr. Xantus; but all of them are young, (between one and two inches long,) and have the three radiating spines, &c., of the preoperculum. It must be remembered that the portion of the description referring to the spinous and soft dorsal and anal fins, is only applicable to the young; the adult doubtless resembles *Trachynotus Carolinus.* * The present species is allied to the latter, but at once distinguished by the small number of dorsal and anal rays. The radial formula equally distinguishes it from all previously known species having the same form. The young of *Trachynotus ovatus*, Gthr., does not essentially differ in form from the adult.

TRACHYNOTUS NASUTUS Gill.

The greatest height equals two-fifths of the length from the snout to the end of the median caudal rays. The head forms three-tenths or more of the length; the snout is produced and subconic, and equals the diameter of the eye, and scarcely less than a tenth of the head's length. The lower jaw is received within the upper. The spinous dorsal is highest at the fifth spine, which equals an eighth of the length, or nearly a third of the height of the body beneath. The second anal spine is as long or longer than the fifth dorsal one. The median caudal rays form an eighth or more of the total length, while the external rays only equal a sixth of the same. The pectoral fin is contained five times and a half in the length.

D. VI. + I. 20. A. II. + I. 19.

The color is silvery; the spinous portions of the dorsal and anal fins thickly punctulated with black; the ventrals white.

This species is very readily distinguished from *T. rhodopus* by the conoid

* The descriptions of *Trachynotus marginatus*, C.V. and *T. cayennensis*, C.V., must be accepted with similar reserve. The statement of the height of the fins of the two new species here described has been retained in order to show how great is the difference between the young and old.

produced snout and the reception of the lower jaw within the upper, as well as by the shorter and less emarginated caudal fin, greater height, &c. Several specimens were obtained, mostly under an inch long. The description of the dorsal and anal fins, as in *Trachynotus rhodopus*, refer only to the young.

TRACHYNOTUS FASCIATUS Gill.

This species is closely related to the *Trachynotus glaucus* of the Atlantic and Caribbean Sea, but is distinguished by the scarcely gibbous snout and the distribution of the vertical bands: the first commencing close in front of the first (erect) dorsal spine; the second between the fourth and fifth, and the third under the fourth and fifth rays. A black spot also appears to exist on the lateral line below the seventeenth dorsal ray, and a black blotch behind the dorsal fin. The produced dorsal and anal lobes are nearly coterminal with the caudal lobes.

A single dried specimen, nearly eight inches long, was given to the Smithsonian Institution by Capt. John M. Dow. The snout is doubtless always less gibbous than, or rather not vertical as in, *T. glaucus*. It cannot be the more mature form of *T. rhodopus* or *T. nasutus*, as the snout, when it does change, becomes more elevated with age. The colors are also quite different, and probably undergo no essential change with age.

Family *SPHYRÆNOIDÆ* Ag.

SPHYRÆNA LUCASANA Gill.

The greatest height equals a tenth of the length, and is a quarter the thickness. The head forms about three-tenths of the length. The snout enters $2\frac{1}{2}$ times in the head, and is more than twice as long as the diameter of the orbit ($\cdot05\frac{1}{2}$). The maxillary bone ceases at a vertical, whose distance from the orbit equals the diameter of the pupil. The tip of the lower jaw has a square, thick flap.

The first dorsal fin commences more than four-tenths ($\cdot42$) of the length from the lower jaw; its second spine rather exceeds the width of the body ($\cdot08$); the second dorsal commences more than six-tenths ($\cdot62$) from the jaw, and is rather lower than the first ($\cdot07\frac{1}{2}$). The caudal enters $6\frac{2}{3}$ times in the whole length.

The pectoral fin extends for about two-thirds of the distance between its base and the ventral, and is less than of the length ($\cdot07\frac{1}{2}$). The ventral is rather longer than the pectoral, and is inserted under the anterior margin of the first dorsal.

The first dorsal commences about over the thirty-fifth scale of the lateral line, and the second over the ninetieth.

D. IV. I. 8. A. 2. 9.

Scales 134.

The color is reddish-brown above the lateral line, and silvery below, with darker blotches along the line.

Family *BERYCOIDÆ* Lowe.

HOLOCENTRUM SUBORBITALE Gill.

The greatest height does not equal a third ($\cdot31$) of the total length; the tail behind the vertical fins nearly equals a ninth of the total length, and nearly the length of the base of the rays; its least height is rather less than a twelfth ($\cdot08$) of the same. The head, from the snout to the opercular margin, forms more than a fourth ($\cdot26$) of the length; the opercular spine is long, and nearly equals a third of the diameter of the eye ($\cdot03$). The preopercular spine extends to the vertical from the base of the opercular one. The diameter of the eye equals a tenth of the total length, and is a third greater than the length of the snout ($=\cdot07$). The preorbital has six or seven moderate teeth, directed backwards.

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The spinous dorsal commences above the posterior margin of the seapular bone; its first spine equals the eye's diameter (·10), and the third is a half longer (·15). The second dorsal at its longest rays rather exceeds an eighth (=·13) of the total length; it ends over the twenty-fifth scale of the lateral line. The anal fin is somewhat larger than the second dorsal; the third spine is very large, its length entering nearly five times and a half (·18) in the total. The caudal fin forms more than a fifth (·21) of the length, while the median rays only equal a tenth.

The pectoral and ventral fins are equally long, and rather less than a fifth (·19) of length.

D. XI. 1. 12. A. IV. 9.

$$\text{Scales } 35 \frac{3}{7}$$

The color is steel, thickly sprinkled with dark dots, which become less numerous downwards. The fins are dark; the dorsal lighter at the anterior half at the base between the spines. The suborbital chain is bright silvery and immaculate.

Genus MYRIOPRISTIS Cuv.

Myriopristis occidentalis Gill.

The height of the body equals 28-100 of the extreme length, while the head forms 3-10 of the same. The snout is much decurved, and, from the apex to the eye, equals nearly half the diameter of the orbit and a fifth of the head's length. The pectoral fin equals a sixth of the extreme length, and the ventral enters $7\frac{1}{3}$ times in the same. The caudal forms a fifth of the whole length.

D. X. 1.13. A. IV. 11.

$$\text{Scales } 35\text{—}36\text{—} \frac{3}{7}$$

Color on the upper half reddish-purple merging into silvery below, punctulated with blackish, especially where the longitudinal rows overlap each other. The fins are immaculate, except a linear border which sometimes margins the spinous dorsal.

Numerous specimens were obtained by Mr. Xantus at Cape St. Lucas.

RHAMPHOBERYX Gill.

This genus is very closely related to *Rhinoberyx*, but has considerably smaller scales $(34\text{–}36\text{–}\frac{3}{7})$ and entire rostro-frontal carinæ, the spine at the angle of the preoperculum is not essentially enlarged, but simply forms the angle at the preopercular.

Rhamphoberyx pœcilopus Gill.

The height of the body equals nearly three-tenths (·29) of the extreme length, and the head forms 27-100 of the same. The snout is blunt, but considerably produced and forms about a fifth of the head's length; the diameter of the orbit is contained three times in the head. The pectoral and ventral fins are equally long, rather exceed a sixth of the extreme length, and nearly equal the caudal fin.

D. X. 1. 14. A. IV. 11.

$$\text{Scales } 35\text{—}36\text{—} \frac{3}{7}$$

The color above the lateral line is olive green, golden green below, and

cupreous in the opercula. The spinous dorsal is dark green in front of each spine, but light behind as well as above and below; the margin is also very dark. The ventral fins have each a broad blackish terminal band. The base of the caudal fin is punctulated with dark spots.

The specimens $1\frac{3}{4}$—$2\frac{1}{3}$ inches long.

RHAMPHOBERYX LEUCOPUS Gill.

This species is very closely related to the preceding and has almost precisely the same proportions, but the snout is perceptibly less produced, and the spinous dorsal and ventral fins almost immaculate, the former having only a linear darker border, and the ventrals sometimes tipped with darker.

D. X. I. 14. A. IV. 12.

Scales $\frac{3}{7}$ 34—35 $\frac{3}{7}$

Cape St. Lucas, (2 specimens.)

Family *ECHENEIDOIDÆ.*

Genus REMORA (A. Dum.) Gill.

The *Echeneis osteochir* of Cuvier and the *E. brachypterus* of Lowe should both be removed from this genus and accepted as the types of as many distinct ones. The *E. osteochir* is distinguished by the rhombic form of the pectoral fins and the ossification of the rays. I have therefore named the specimens in the Smithsonian Institution *Rhombochirus osteochir.* The *E. brachypterus* is distinguished by the shorter anal fin and angular upper jaw. It may be called *Remoropsis brachypterus.*

REMORA JACOBŒA Gill.

Echeneis remora *Günther*, Catalogue of the Acanthopterygian Fishes, &c., Vol. ii. p. 378.

A specimen of *Remora* obtained by Mr. Xantus at Cape St. Lucas is provisionally referred, as by Dr. Günther, to the old *Echeneis remora* of Linnæus.

Descriptions of some new species of PEDICULATI, and on the classification of the group.

BY THEODORE GILL.

The group called by Cuvier *Acanthoptérygiens a pectorales pédiculées* and estimated as a family, is a very natural one, distinguished by the incomplete ossification of the skeleton, the prolongation of the carpal bones to form "pedicles" for the pectoral fins, and, finally, by the abnormal position of the very small branchial apertures. While these characters are not sufficient to entitle the group to ordinal distinction, they seem to be of much more than family value; it may be called a suborder, for which the name *Pediculati* may be retained. The genus *Batrachus*, referred to the Pediculati by Cuvier, has really little affinity to the true representatives of the group, and has been, by general consent, separated from them by all the more modern systematists.

In the suborder, four very distinct types distinguished by difference of form and structure are comprised. Those types must therefore be regarded as representative of as many families. Dr. Bleeker has attempted to distribute the several genera among families, which have not been characterized, but which were evidently separated on account of superficial differences of form. This is apparent on an examination of his system.

Phalanx 1, Herpetoichthyes seu Pediculati, *Cuv.*

Ordo 15, Antennarii.

Familia 41, Cheironecteoidei = Chironectidæ *Swns.*
Gen. Antennarius *Comm.* Brachionichthys *Blkr.*, Chaunax *Lowe*, Ceratias *Kroyer.*
Familia 42, Malthæoidei.
Gen. Malthæa *Cuv.*
Familia 43, Lophioidei = Lofidi *Raf.*
Gen. Lophius *L.*, Halieutæa *Val.*

The following synoposis is an expression of my views of the relations of the various members of the suborder.

I. Branchial apertures above in the axillæ of the pectoral fins. Mouth subterminal or inferior, the lower jaw being received within the upper..... MALTHÆOIDÆ.
II. Branchial apertures below, in or behind the inferior axillæ of the pectoral fins. Lower jaw projecting beyond or closing in front of upper.
1. Head very large and flattened. Mouth transverse horizontal. Pyloric cæca..... LOPHIOIDÆ.
2. Head compressed or cuboid. Mouth vertical or very oblique. Pyloric cæca none. Dorsal fin oblong. Ventrals developed..... ANTENNARIOIDÆ.
2. Head compressed. Mouth with cleft subvertical. Pyloric cæca two. Dorsal fin very short, like anal. Ventral fins obsolete..... CERATIOIDÆ.

The following is an enumeration and synopsis of the representatives of the several families. As Dr. Bleeker was the first to name one of the families, I have credited it to him, although he neither defined it nor restricted it in the same manner as is here done. As it is, however, only necessary that the type which the author considered as the representative of any group should be known in order to necessitate the retention of a name. Bleeker's must be retained. The generic name of *Perca*, for example, is credited to Linnæus, but, under that name, representatives of different families were confounded by the author, and the name is now accepted in an entirely different sense. The *name* alone is adopted, and not the idea or definition connected with it by Linnæus.

Family *MALTHÆOIDÆ* (Blkr.) Gill.

I. Disk cordiform, produced from the snout; body robust..... MALTHEINÆ.
Malthe.
II. Disk orbicular, obtuse in front; body slender..... HALIEUTÆINÆ.
1. Mouth small. Rostral tentacle obsolete..... Halieutichthys.
2. Mouth large. Rostral tentacle developed..... Halieutæa

Subfamily *MALTHEINÆ* Gill.

Genus MALTHE Cuv.

Temperate and Tropical Eastern America.

Subfamily *HALIEUTÆINÆ* Gill.

Genus HALIEUTICHTHYS Poey.

Caribbean Sea, representing *Halieutæa.*

Genus HALIEUTÆA Val.

Astrocanthus *Swainson*, ii. 331
Eastern Asia.

Family *LOPHIOIDÆ* (Raf.) Gill.

Genus LOPHIUS (Linn.) Cuv.

Family *ANTENNARIOIDÆ* Gill.

Chironecteoidei *pt. Blkr.*

As Dr. Bleeker's family appellation is a modification of a generic name that cannot be retained for a representative of this family, it having been previously taken for a valid genus of Marsupial mammals, I do not deem it advisable to retain it.

I. Head cuboid. A rostral spine or tentacle only developed..... CHAUNACINÆ.
Chaunax.

II. Head much compressed. The rostral spine or tentacle as well as two other robust spines developed..... ANTENNARIINÆ.

1. Second spine not connected with third. Body short with tumid abdomen. Palate armed with teeth.

* First and second spines disconnected.

α. D. 12. A. 7. Body smooth or scarcely granular. Mouth small. Wrist and pectoral slender. Ventrals elongated. Anal extended downwards.. Pterophryne.

β. C. 12. A. 7—8. Body with spines, generally forked. Mouth moderate. Wrist and pectoral widened. Ventrals short. Anal oblong..... Antennarius.

γ. D. 15. A. 8. Body smooth..... Histiophryne.

** First and second spines connected..... Saccarius.

2. Second and third spines well connected by membrane, and forming a fin, but distinct from first. Body oblong. Palate unarmed..... BRACHIONICHTHYINÆ.
Brachionichthys.

Subfamily *CHAUNACINÆ* Gill.

Genus CHAUNAX Lowe.

Maderia.

Subfamily *ANTENNARIINÆ* Gill.

Genus PTEROPHRYNE Gill.

Type Cheironectes lævigatus *Cuv.*

Genus ANTENNARIUS Comm.

Cheironectes *Cuv.* nec *Illiger.*

Type Antennarius princeps *Comm.*

Genus HISTIOPHRYNE Gill.

Type Cheironectes Bougainvillii *Cuv.*

Genus SACCARIUS Gthr.

Coasts of New Zealand.

Subfamily *BRACHIONICHTHYINÆ* Gill.

Genus BRACHIONICHTHYS Blkr.

Coasts of Van Diemen's Land, &c.

Family *CERATIOIDÆ* Gill.

Genus CERATIAS Kroyer.

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Family *MALTHÆOIDÆ* (Blkr.) Gill.

Genus HALIEUTICHTHYS Poey.

Disk suborbicular or ovate-orbicular, about as long as the rest of the body and caudal fin combined. Forehead with a transverse bony ridge, beneath which is a cavity destitute of a tentacle. Eyes dorsal, oblique, nearly equally

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remote from each other and the edge of the disk. Mouth rather small, inferior, with the lower jaw nearly semi-circular.

Teeth fine, on the jaws and palate.

Dorsal fin nearly behind the disk, much higher than long, with about four rays. Anal behind the second dorsal, and also provided with about four rays. Caudal rather long and subtruncated. Pectoral fins on peduncles, which are attached to the body by the membrane.

This most interesting new generic type was discovered last year by Prof. Poey at the Island of Cuba. That gentleman has kindly sent the only specimen obtained to the Smithsonian Institution. He has recognized its generic distinction from *Halieutæa*, distinguishing it by the absence of a barbel in the frontal cavity and the dentition. It is still further distinguished from the Asiatic genus by the much smaller mouth, and also by the attachment of the carpal bones to the body.

HALIEUTICHTHYS RETICULATUS Poey.

The disk is longer than wide, and somewhat oval, being narrower before than behind. The ridges alone are covered with simple spines; *five* spines form a *pentagon* before the interorbital area; *one* over each orbit, and *four* are on a ridge proceeding backwards from the posterior angle of each orbit, which converges in a curve towards the opposite one; the last form the anterior angles of a *transverse pentagon on the nape.* A transverse ridge behind the eyes, which intersects the longitudinal ones, and has at the angles the second spines from the eyes, provided near each lateral end with another spine, and a swelling at the end itself. Five bicuspid spines arm each lateral margin of the disk, and between them are smaller simple ones.

D. 4. A. 4.

The color is gray, reticulated with blackish. The caudal is crossed by three blackish bands.

The principal proportions are exhibited in the following table:

Extreme length $(1\frac{8}{12})$ 100.

Disk—Greatest length 51; greatest width 45.

Dorsal (*spinous*)—Distance from snout 56.

Anal—Distance from snout 60.

Caudal—Length 14.

Pectoral—Distance from snout at upper axilla 47; length 14.

Family *ANTENNARIOIDÆ* Gill.

Genus ANTENNARIUS Comm.

ANTENNARIUS SANGUINEUS Gill.

The anterior dorsal spine is very slender and enters $2\frac{1}{2}$ times in the length of the caudal fin; it terminates in a flap extended on each side laciniated outwards. The second spine is rough, robust and curved strongly backwards at its end; the third is not free, but apparent as a hump pointed backwards, and extending two-thirds of the distance from its insertion to that of the dorsal fin. Skin covered with small bifid spines, whose prongs diverge considerably and are acute.

The color is blood-red, except on the abdomen, both with several more or less distinct black spots under the origin of the dorsal fin and on the sides. The abdomen is light or yellowish-brown, spotted with black. The intervals between the caudal and anal rays are also marked with black. The floor of the mouth behind the tongue has two lateral black bands converging towards the front, while the posterior margin of the tongue itself is also sometimes lined with black.

Two specimens were obtained at Cape St. Lucas by Mr. Xantus.

ANTENNARIUS ANNULATUS Gill.

The first dorsal spine is very slender, straight and nearly equals the length

of the caudal fin; it terminates in two simple tentacles, while a third longer one arises from front near its end; the second spine is curved at the middle and extends to the base of the third; the membrane is slight; the third spine is curved at the middle and partly free, but attached by the skin and only partially erectile; it reaches more than half way to the dorsal fin. The skin is covered with bifid spines.

The body and fins are fawn-colored, lighter on the abdomen, with a few scattered ocellated dots, more abundant on the internal face of the pectoral fin as well as ventral; the abdomen has darker fawn spots. There are larger ocelli,—black, edged with white,—on the marginal half of the dorsal and anal fins, and on the caudal; on the latter, three larger ocelli form a triangle. A still larger ocellns is on the back at the base of the ninth dorsal ray, and another between the fonrth and fifth anal rays. A pink spot exists at each corner of the mouth; the second dorsal spine and streaks on each side of its groove are colored likewise, and in front of the dorsal is a pink triangular saddle, sending from each anterior angle a fawn streak margined with whitish to a pinkish area before the pectoral, above which it merges in a marbled fawn area. A broad pink ring encircles the base of the eandal fin, which itself, as well as the posterior half of the dorsal and anal fin, have a submarginal pink band.

A single specimen was obtained by Lt. Wright, U. S. A., at Garden Key, Florida, and is in the collection of the Smithsonian Institution.

Antennarius pleurophthalmus Gill.

The anterior dorsal equals about a third of the length of the caudal fin, and has at its end a laciniated or fringed lobe extending upwards; the second is moderate, slightly curved, and rather longer than the first, and with a membrane extending nearly to the base of the third spine; the latter is free, extends backward nearly to the fin, and almost connected with it by the membrane. The skin is covered with minnte bifurcated spines.

The color is brown, marbled with lighter, especially before and behind the dorsals, and above the pectorals; distant black dots are also scattered over the body. *Three* large *ocelli* or black spots, margined with light-brown, are on each side; one at the middle of the basal half of the dorsal; a second below, intermediate between it and the anus, and a third in the middle of the caudal fin. The floor of the month behind the tongue is black, with whitish-yellow radiating lines, while the tongne itself is light-brown, with darker radiating bands or spots.

A single specimen of this species is in the collection of the Smithsonian Institution, and was probably obtained at Key West.

Antennarius strigatus Gill.

The anterior dorsal spine is very slender and filiform, without appendages; the second is straight and moderate; the third concealed and only developed as a hump, obtuse behind. The spines which cover the body are small and mostly bifid.

The back and front of the dorsal fin are reddish; the rest light-brown, with black stripes which diverge downwards above the pectorals, those in front being parallel with the profile, and at right angles with those behind. Arounnd the pectoral fins and on the flanks, the streaks are generally blended to form a continuous black area. A black dorsal saddle is in front of the dorsal fin, and a black band covers the posterior half of the caudal fin. The abdomen is broadly reticulated with black, and the brown intervals themselves are frequently striated with the same color. The interior of the mouth is immaculate.

Cape St. Lucas, (J. Xantus.) Two specimens.

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Enumeration of the ARCTIC PLANTS collected by Dr. I. I. Hayes in his Exploration of Smith's Sound, between parallels 78th and 82d, during the months of July, August and beginning of September, 1861.

BY E. DURAND, THOS. P. JAMES AND SAML. ASHMEAD.

Although the following enumeration does not contain any new plants, it is, nevertheless, sufficiently interesting in other respects not to be passed unnoticed. In a geographical point of view, it exhibits the peculiar vegetation of the most northern portion of the globe as yet visited by civilized man, and illustrates several facts which are not devoid of interest.

In his Arctic exploration, Dr. Hayes has been very active in collecting specimens in the different branches of Natural History, which he has liberally presented to the Philadelphia Academy of Natural Sciences. His botanical collection, which was placed in my hands, was not so numerous in species as that of his predecessor and former Arctic companion, Dr. Kane; but the latter had collected along the whole western coast of Greenland, from 65° upwards, whilst Dr. Hayes' collections have been confined to the limits of the 78th and 82d parallels, where, naturally, a greater scarcity of species was to be expected.

From those extreme Arctic latitudes, in which the thermometer of Fahrenheit scarcely ever reaches 55°, with the ground continually frozen and mostly covered with snow, Dr. Hayes brought seeds, apparently in a perfect state of maturity; and also some living roots, imbedded in their own rich soil, and carefully packed in boxes. Among those roots, with their somewhat withered stems, could be recognized *Salix Arctica* and *S. herbacea*, *Tofieldia palustris*, and *Ranunculus nivalis*, large tufts of *Andromeda tetragona*, *Armeria Labradorica*, *Silene acaulis*, &c. All these, at their arrival in Philadelphia, in the beginning of January, 1862, were entrusted to the care of our fellow-member, Mr. Kilvington, a skilful horticulturist, who resorted to every means his experience and ingenuity could suggest, to insure their vegetation.

Some of the seeds, those of the *Cruciferæ* especially, germinated well and put forth the primordial leaves; the roots began early to show signs of vegetation; the buds of the willows enlarged, but never arrived at expansion. *Andromeda* gave some hope of success, and *Lycopodium annotinum* and a species of *Hypnum* resisted the longest. But as soon as the plants ceased being supplied with ice and snow, they began to droop and die, the one after the other, and, by the middle of April, not one of those Arctic denizens, except *Hypnum*, remained to enjoy the sweets of our Philadelphia spring.

Another remarkable fact: The Arctic soil, in appearance so rich, in which the roots were imported, had been found to contain numerous seeds that had given expectations of a good harvest of hyperboreal plants. Mr. Kilvington carefully watched them, early in the spring. They were seen, gradually, to swell and burst, but no sign whatever of germination took place in them. Nor in the whole course of the summer and autumn to this day, has that ground produced a single plant germinated from the seeds that must inevitably have been disseminated over it from the neighboring plants in the garden.

Incited by the apparent richness of that Arctic soil, Mr. Kilvington planted in it some species of *Erica;* but they, also, soon languished and would have died had they not been removed to a more genial ground. Evidently, that Arctic soil had become perfectly unproductive out of its ever-frozen zone!

E. D.

PHÆNOGAMOUS PLANTS.

BY E. DURAND.

1. Ranunculus nivalis, *Linn.*	Gale Point, July 29.
2. Papaver nudicaule, *Linn. P. alpinum*, Linn.	Every Station, July and Aug.
3. Hesperis Pallasii, *Torr. and Gr. H. pygmæa*, Hook.	Netlik, Aug. 4.
4. Draba Alpina, *DC.* var. glabra.	Port Foulke, July.
5. " " var. hispida, *R. Br.*	" "
6. " corymbosa, *R. Br.*	Netlik, Aug. 4.
7. " rupestris, *R. Br.*	" "
8. Vesicaria arctica, *Richards.*	" "
9. Cochlearia officinalis, *Linn.*	Cape Isabella, July 28.
10. Alsine (Arenaria) rubella, var. hirta, *Vahl.*	Netlik, Aug. 4.
11. Stellaria humifusa, *Rottb.*	" "
12. " stricta, *Richards.*	" "
13. Cerastium Alpinum, *L.* var. Fischerianum, *Torr. & Gr.*	Port Foulke, July 15.
14. Silene acaulis, *Linn.*	Netlik, Aug. 4.
15 Lychnis apetala, *Linn.*	" "
16. " pauciflora, *Fisch.*	" "
17. Dryas octopetala, *Linn.*	" "
18. " integrifolia, *Vahl.**	" "
19. Potentilla nivea, var. pulchella. *P. pulchella*, Hook.	Port Foulke, July.
20. Potentilla nivea, var. hirsuta. *P. hirsuta*, Vahl.	Netlik, July and Aug.
21. Alchemilla vulgaris, *Linn.*	" July 12.
22. Saxifraga oppositifolia, *Linn.*	Gale Point, &c., July and Aug.
23. " flagellaris, *Willd.*	" " 27.
24. " cæspitosa, *Linn.* var. uniflora.	" 23.
25. " rivularis, *Linn.*	Netlik, Aug. 4.
26. " trieuspidata, *Retz.*	Port Foulke, July 15.
27. " cernua, *Linn.*	" "
28. " nivalis, *Linn.*	" "
29. Leontodon palustre, *Linn.*	Netlik, Aug. 4.
30. Campanula rotundifolia, *Linn.*, var. linifolia, *Gr.*	Tessuissak, Sept. 4.
31. Vaccinium uliginosum, *Linn.*	Netlik, Aug. 4.
32. Andromeda tetragona, *Linn.*	Port Foulke, July and Aug.
33. Pyrola grandiflora, *Raddi. P. Grœnlandica*, Horn.†	Tessuissak, Sept. 4.
34. Bartsia alpina, *Linn.*	" "
35. Pedicularis hirsuta, *Linn.*‡	Port Foulke, July and Aug.

* I have no doubt of the correctness of Chamiso and Schlechtendal's view, "that *Dryas integrifolia* is the more Arctic form of *D. octopetala* of Linnæus." Almost all the specimens of Dr. Hayes were with narrow, entire leaves, but some exhibited the intermediary forms of both varieties, and a single one was a perfect specimen of *Dryas octopetala*.

† Dr. Jos. D. Hooker, in his "Outlines of the Distribution of Arctic Plants," (Trans. Linn. Soc. Lond., Vol. xxiii, p. 2.) is perfectly right in suspecting *Pyrola chlorantha* of my Plantæ Kaneanæ to be *P. grandiflora*, Raddi. This I have ascertained to be the fact, on the better specimens brought by Dr. Hayes.

‡ *Pedicularis hirsuta*, L. Was fairly represented both in Dr. Kane's and Dr. Hayes' collections. It appears to be much more common, in those hyperboreal regions, than either *P. Langsdorffii* or my *P. Kanei*, of which Dr. Kane brought only a single specimen, that has been submitted to Prof. Asa Gray. In his Enumeration of Dr. C. C. Parry's Plants of the Rocky Mountains, (Am. Jour. Sc., Vol. xxxiv, 2d ser. p. 251,) Dr. Gray expresses himself in the following words, with regard to some,

36. Armeria vulgaris, *Willd.* var. *A. Labradorica*, Vahl. — Netlik, Aug. 4.
37. Polygonum viviparum, *Linn.* — " "
38. Oxyria digyna, *Campd.* — Every Station, July and Aug.
39. Empetrum rubrum, *Willd.* Spec. Pl. 4, p. 713. (A variety of E. nigrum ?) * — Tessuissak, Sept. 4.
40. Betula nana, *Linn.* — Port Foulke, July 15.
41. Salix arctica, *Linn.* — Every Station, July and Aug.
42. " herbacea, *Linn.* — Port Foulke, July 15.
43. Tofieldia palustris, *Linn.* *T. borcalis*, Vahl. — " "
44. Luzula campestris, var. congesta, *Wahl.* *L. hyperborea*, of Danish authors. — Tessuissak, Sept. 4.
45. Carex rigida, *Good.* — Netlik, Aug. 4.
46. Eriophorum vaginatum, *Linn.* — Gale Point, July 27.
47. Alopecurus alpinus, *Linn.* — Port Foulke, &c., July.
48. Glyceria arctica, *Hook.* — " " 15
49. Poa arctica, *R. Br.* — " " "
50. Poa Vahliana, Bot. Dan.? (Too young.) — " " "
51. Hierochloa borealis, *Roem. and Schl.* — Tessuissak, Sept. 4.
52. Festuca ovina, *Linn.* — " "

CRYPTOGAMOUS PLANTS.

LYCOPODIACEÆ.

53. Lycopodium annotinum, *Linn.* — Tessuissak, Sept. 4.

Musci and Lichenes were placed in the hands of Mr. Thos. P. James, the excellent cryptogamist, who has returned them with the following note: "I return the *Musci* and *Lichenes* from Dr. Hayes' Arctic expedition. I have named them as best I could, from their imperfect condition,—not a single fruiting specimen was to be found in the entire collection! This fact rendered their determination the more difficult. Several, which I could not determine, may be new species, but they were not in a state clearly to be analyzed."

MUSCI.

BY THOS. P. JAMES.

54. Andræa petrophila, *Ehrh.?*
55. Barbula ruralis, *Hedw.*
56. Orthotrichum affine, *Schr.*
57. Grimmia spiralis, *Hook. & Tayl.*
58. Racomitrium lanuginosum, *Brid.*
59. Pogonatum alpinum, *Brid.*
60. Polytrichum juniperinum, *Hedw.*
61. Aulacomium turgidum, *Schw.*
62. Bryum Duvallii, *Voit.*
63. " purpurascens, ?
64. " arcticum, *Brid. & Sch.*
65. " rutilans, *Brid. & Sch.*
66. " cyclophyllum, *Brid. & Sch.*
67. " crudum, *Schr.?*
68. " nutans, *Schr.*
69. " palustre, *Linn.*
70. " æneum, *Blytt.*

Arctic Greenland species of *Pedicularis*: "*P. Kanei* of Durand does not belong to *P. Sudetica*, as Dr. Hooker supposed, but to *P. lanata*, Willd.; which again, contrary to Bentham and Hooker, I must regard with Bunge as clearly different from *hirsuta* of Linnæus; it is much nearer another species which Dr. Hooker refers to *Sudetica*,—viz: *Langsdorffii*, with which it has been confused; but it is perfectly edentulate. The teeth of the latter, however, are inflexed, and so may escape observation. All these species are well discriminated by Bunge, in Ledebour's *Flora Rossica*.

* Drupe red, stems apparently smaller and more decumbent than in *E. nigrum*, from which it does not otherwise differ. Dr. Kane's specimens belonged probably to the same form; but having no fruit on, I referred them, naturally, in my *Plantæ Kanenanæ*, to *Empetrum nigrum*.

It is a remarkable fact of geographical botany, that this red-fruited species, originally found on the shores of the Strait of Magellan, should appear again at the opposite extremity of the American continent. Messrs. La Pylaie and Tuckerman met with it in Newfoundland, and, quite lately, Abbé Ferland, a Catholic missionary of the Laval University of Quebec, found it likewise on the coast of Labrador, together with *Empetrum nigrum*.

71. Mnium affine, var. rugicum, *Bland.*
72. " rostratum, *Schw.*
73. Meersia Albrotinii, ?
74. Bartramia, aff., calcareæ.
75. Conostomum boreale, *Swartz.*
76. Splachnum Wormskioldii, *Brid.*
77. " vasculosum, *Linn.*
78. Hypnum uncinatum, *Hedw.*
79. " aduncum, *Linn.*
80. " oligorrhizon, *Brid. & Sch.*
81. " nova species?

LICHENES.

BY THOS. P. JAMES.

And submitted to Ezra Michener, M.D.

82. Alectoria bicolor, (*Ehrh.*) *Nylander.*
83. " sulcata? (*Lev.*) *Nyl.*
84. " ochroleuca, (*Ehrh.*) *Nyl.*
85. Lecanora ventosa, *Ach.*
86. Neuropogon Taylori, *Hook., Nyl.*
87. Platysma cucullata, *Hoff.*
88. " nivalis, *Ach.*
89. Plocadium elegans, (*Ach.*), *Nyl.*
90. Parmelia saxatilis, (*Linn.*) *Ach.*
91. " Borreri, *Turner.*
92. " stygia, (*Linn.*) *Ach.*
93. " conspersa? (*Ehrh.*) *Ach.*
94. Dactylina Arctica, (*Rich.*) *Nyl.*
95. Stereocaulon denudatum, *Floerk.*
96. " condensatum, *Hoff.*
97. Cladonia pyxidata, (*Linn.*) *Fries.*
98. " furcata, var. racemosa, *Hoff.*
99. Cladonia ignota?
100. Lecidea geographica? *Hoff.*
101. Umbilicaria hyperborea! *Hoff.*
102. Ignota "
103. Verrucaria popularis, *Floerk.*
104. " maura, var. striatula, *Hoff.*

ALGÆ.

BY SAML. ASHMEAD.

105. Fucus vesiculosus, *Linn.*
106. Alaria esculenta, *Grev.*
107. Ulva latissima, *Linn.*
108. Laminaria phyllitis, *Lam.*
109. " longicruris, *Pylaie.*
110. Laminaria fascia, *Ag.*
111. " saccharina? *Lam.*
112. Rhodymenia interrupta, *Grev.*
113. Enteromorpha compressa, *Grev.*
114. Soliera chordalis, *Ag.*
115. Cladophora arcta, *Dill.*
116. Bryopsis plumosus, *Ag.*
117. Desmarestia aculeata, *Lam.*
118. Chætomorpha littorea, *Haw.*
119. Ectocarpus?
120. Ignota.

Additions to the Catalogue of Stars which have Changed their Colors.

BY JACOB ENNIS.

I beg leave to add the following continuation to the Catalogue of six stars which have changed their colors, recently presented as a verbal communication:

7. Procyon. In 1850 Humboldt classed Prosyon among the yellow stars: Cosmos, Vol. 3, p. 182. In a verbal communication to this Academy, Feb. 17th, 1863, I announced that this star is now very decidedly blue; and in this all to whom I have referred the color agree without the least hesitation.

8. Rigel. This star is classed among the white stars by Donati, in a Memoir dated August, 1860, and published in the Annals of the Museum at Florence in 1862. It is now decidedly blue. During the past two months it has been observed by myself and some friends to be one of the most deeply-colored of all the stars now visible in this latitude.

9. Alpha Lyræ, or Vega. Donati, in the Memoir just named, classes Vega among the white stars. Humboldt, in 1850,—Cosmos, Vol. 3, p. 183,—says, "the light of Alpha Lyræ is bluish." To myself it now appears pale blue, very much like Capella.

10. Castor. Donati, in 1860, classed Castor among the yellow stars. Humboldt, in 1850, says, "Castor is a greenish star."—Cosmos, Vol. 3, p. 177. It appears to me greenish now,—March, 1863.

There is a close cluster of more than a hundred stars, known as Kappa

[Mar.

Crucis, in the Southern hemisphere, and when seen through a telescope, the very varied colors of its indivdual stars give it, according to Sir John Herschel, "the effect of a superb piece of fancy jewelry." During his residence at the Cape of Good Hope, he made a drawing or map of this group, and stated carefully the colors of eight of its most conspicuously-colored stars. Just a quarter of a century later, F. Abbot, Esq., in a communication to the Royal Astronomical Society in England, dated, Private Observatory, Hobart Town, May, 1862, describes how this piece of jewelry has changed. Six of these eight stars have now different colors. The changes, according to him, are as follows:

11. Gamma kappa crucis: Changed from greenish white to bluish purple. There is an error in Mr. Abbot's communication, as printed in the Monthly Notices of the Royal Astronomical Society. The name of this star is there printed nu, instead of Gamma. Sir John's list has no nu.

12. Delta kappa crucis: has changed from green to pale cobalt.

13. Epsilon kappa crucis: has changed from red to Indian red.

14. Zeta kappa crucis: has changed from green to ultra-marine.

15. Phi kappa crucis: has changed from blue green to emerald green.

16. Alpha^2 kappa crucis: has changed from ruddy to the similar color of all the small stars of that magnitude. "The smaller stars, from the 10th to the 14th magnitude, are generalized, and all partake of nearly the same color, —Prussian blue,—some with a little more or less tint of red or green mixed with the blue."

Arago says that certain of the double stars designated by Sir William Herschel as having a yellow color, are at present, according to Struve, orange and red. Others, which according to Herschel shone with a perfectly white light, exhibit, according to recent observations, a golden-yellow, red, and even greenish-blue. These will be added to this catalogue in due time.

Sirius, Procyon, Capella. The Memoir of Donati brings down the former colors of these stars to a much later date than any authority I had found previous to my communications of Feb. 10th and 17th. In August, 1860, he still classes the two former among the white stars. A very few months afterwards, Sirius was observed by Dr. Wilcocks to be changed. At the same date, also, Donati classes Capella among the yellow stars, but, by the authority quoted in the Proceedings of Feb. 10th, it was blue in September, 1859! and had been so I know not how long. After making due allowances for this discrepancy, if such it be, these are strikingly sudden changes, but not more impressive than those in the cluster Kappa Crucis, where six out of eight stars had changed their colors in a quarter of a century. Beta Ursa Minoris has often vibrated between yellow and red. The very reliable German observer, Heis, wrote: "I have had frequent opportunities of convincing myself that the color of this star is not always equally red; at times it is more or less yellow, at others most decidedly red." Captain Berard "had for some years seen Alpha Crucis growing red." The temporary star of 1572 in a few months passed through the colors white, yellow, red, another shade of red, and again a duller white. The suddenness and the variety of the changes a star may undergo, are no reasons against their reality. But all this shows the need of caution on the part of the observer, and how a writer should not publish the color of a star as existing at any date, which color may depend altogether on observations of some prior date. Discrepancies must in this way occur, and in this way we may perhaps account for a discrepancy in Humboldt's Cosmos, Vol. 3, p. 181, where, apparently using an old catalogue, he classes Vega among the white stars, but on p. 183, where he individualizes to prove the existence of blue stars, he says, "the light of Alpha Lyræ is bluish." The discrepancy just shown between Kearney and Donati may, perhaps, be similarly explained. A discrepancy of a different kind appears in the Proceedings of the 10th of February of this Academy. Dr. Wilcocks, in announcing the change of Sirius, gave the present color as violet, but previous to the next

meeting, Feb. 17th, he convinced himself that his impression was wrong, and that the present real color of Sirius is green; and he obtained consent that the Minutes, when printed, should be altered accordingly; but by some oversight this alteration was not made. In denominating Sirius purple in October last, I dissented, for it appeared to me plainly green. The three successive, undisputed colors of Sirius therefore are red, white and green. There is special need of attending to discrepancies in the beginning of this catalogue, both as to *color* and to *dates*. This is the only way to insure progress.

It is to me an impressive fact that so many conspicuous stars now nightly appear blue or green; especially as the first blue stars were mentioned by Mariotte, so lately as in 1686;—before him, no departure from white was named but red, with the exception of the yellow in the temporary star of 1572. Capella, Bellatrix, Rigel, Procyon, Vega, Beta Libræ are blue; all deeply so except Capella and Vega. Sirius is conspicuously green, and Castor slightly green, though I sometimes doubt the greenness of the latter. When a star is not of the first magnitude, or when its departure from white is not very decided, a long fixedness of the eye upon it is necessary, and a careful exclusion of artificial lights. At least, this is my experience. It has occurred to myself, and been suggested by others, that perhaps this blueness of so many large stars now in view, and greenness, which is a modification of blue, may be owing to some special atmospheric cause. For many months the air has been unusually damp. But this cannot be the cause of these colors, for Aldebaran Betelguese and the planet Mars are in the midst or near vicinity of some of these blue and green stars, and preserve their ordinary redness. Pollux, however, in the same general neighborhood, seems hardly entitled to be called a red star. From the fact that it was classed among the six decidedly red stars by the ancients, I regard it as changed, but desire further time before announcing the change in the catalogue. Humboldt calls it merely "reddish."

I would not be premature in speculating on the laws or causes of these changes, but must remark that the change of Sirius, from its ancient red to white, and now to green, is all in the same direction, namely: a *relative* diminution of the red. The three primary colors, red, yellow and blue, with an excess of red, will give a red star; take away the excess of red and the star will be white; take away still more of the red and it will be green,—that is, a combination of the remaining yellow and blue. The three colors of Sirius, therefore, the ancient red, the modern white and the recent green, may possibly be due to the operation of a single cause.

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Communication, March 24th.

Mr. Cassin read the following interesting extracts from a letter to Prof. R, Dunglison, of this city, from Dr. James A. Grant, of Ottowa city, Canada. dated Feb. 10th, 1863, relating to the Willow Grouse, or Ptarmigan, *Lagopus albus*: "During the present winter, the Ptarmigan or White Grouse has been observed in large numbers at the head waters of the Gatineau river, (a tributary of the Ottowa river,) distant from Ottowa city about 120 miles. In that locality, lumberers are constantly engaged, who have, this season, procured these birds in considerable numbers, a very unusual circumstance, as years frequently elapse without one being observed. This bird seems to be guided in its migration by peculiarities of climate, and is only seen in this particular locality when the season is very cold. Since the year 1844 it has not been observed by the lumberers until the present season, and it seems that nothing short of excessive arctic cold will bring it from its more northern abode."

"It is stated by Buffon that the Ptarmigan avoids the solar heat, and prefers the biting frost on the tops of mountains. These peculiarities I have also observed here. This bird appears to enjoy the soft snow on the hill sides,

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and frequently makes holes in it and thus shelters itself during the night. In this position it is occasionally found frozen in by a superficial crust of ice which formed during the night, caused by the fall of rain, and owing to a sudden change of temperature, which is not an unusual circumstance even in these northern localities."

"Owing to their absence in a great measure from the inhabited northern localities, these birds do not possess that degree of fear which is observed in other members of the Grouse family, in consequence of which they are easily shot or caught in snares. They are said to pair at the same time as the red Grouse. The female lays 10 to 12 eggs, which are white and marked with brown spots, and which are deposited on the ground, no nest being provided. Having examined carefully the digestive organs of this bird, I found the principal contents to be small twigs and buds of the Birch tree, mixed with small particles of sand. These twigs were nicely divided into pieces, varying from one-eighth to one-quarter of an inch in length, and in examining the beak it will be observed that it possesses considerable strength, and from its peculiar formation is beautifully adapted to the division of these small shoots or twigs, from which this bird appears to derive the greater part of its nourishment. I have much pleasure in sending to you specimens of both sexes for the Academy of Natural Sciences."

April 7th.

The President, Mr. Lea, in the Chair.

Twenty members present.

The following were offered for publication:

Descriptions of new Squamata. By E. D. Cope.

Descriptions of new species of Vireonidæ, &c. By Geo. N. Lawrence.

Descriptions of new species of Pedipalpi. By Dr. H. C. Wood, Jr.

April 14th.

The President, Mr. Lea, in the Chair.

Twenty-seven members present.

April 21st.

The President, Mr. Lea, in the Chair.

Twenty-two members present.

April 28th.

The President, Mr. Lea, in the Chair.

Nineteen members present.

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

Descriptions of new American SQUAMATA, in the Museum of the Smithsonian Institution, Washington.

BY E. D. COPE.

Tantilla miniator Cope, sp. nov.

Tail one-fifth the total length. Postnasal equal to second superior labial, and largely in contact with the preocular; which is hexagonal, and as long as high. Two post-oculars; seven superior labials, eye over third and fourth; fifth very narrow. First inferior labial not separating symphyseal and geneials. Temporals two large, two small. Occipitals rather large; vertical, scarcely longer than broad, more acute angled posteriorly, the frontal, superciliary and occipital sutures equal. Muzzle subtruncate. Scales in thirteen rows. Length of head and body 30″, of tail 7″.

Above blackish brown, on the nape blackish; a yellow collar two scales wide, touching tips of occipitals; head above blackish, except two large yellowish spots on the superior labials, one below the nares, and one behind the eye. Under surfaces salmon-colored, palest anteriorly.

Habitat.—Mirador, near Vera Cruz. From Dr. Charles Sartorius' collection made for the Smithsonian Institution. (No. 13.)

A species allied to coronata Bd. Grd., (which Jan confounds with the melanocephala), but differing in the broader and more obtuse head, and darker coloration. The reticulata has a much longer tail.

Tropidodipsas sartorii Cope, sp. nov.

Rather stout; tail one-sixth of the total length. Head swollen at the temples, muzzle broad, thick; eyes medium. Rostral not prominent, as high as broad. Nasals two, large; loreal nearly square, in contact with orbit; one very small preocular above it, widely separated from vertical; two postoculars. Top of head arched, a little swollen behind. Postfrontals very large; vertical broader than long, five-sided; superciliaries small. Occipitals with a concave outer border. Five temporals, one in contact with postoculars, little longer than fifth superior labial. Six superior labials, eye over fourth, but touching third. Nine inferior labials, fifth largest; two pairs of very small geneials behind the moderate anterior pair. Scales in seventeen longitudinal series, the three median slightly keeled. Gastrosteges rounded, slightly bent upwards on the sides. Length of head and body 47″, of tail 9″.

Black, with fifteen yellowish (? red) rings three scales wide, each scale black tipped. Last ring including tips of occipitals, last superior labial, and chin, except inferior labials; five light rings on tail.

Habitat.—Mirador, Vera Cruz. Discovered by Dr. Charles Sartorius, (Coll. No. 20,) to whom the species is dedicated. This gentleman has also obtained at the same place, among other species, Ninia collaris (*Streptophorus sebæ, collaris* Jan.) Drymobius margaritiferus, Lampropeltis micropholis, Boa eques.

Rhadinæa poecilopogon Cope, sp. nov.

Slender; head distinct elongate, convex; muzzle elongate, narrowly rounded. Scales narrow, in seventeen longitudinal rows. Tail more than one fourth of the total length. Superior head-plates normal, elongate, especially the vertical, which has straight outlines. Loreal nearly equilateral, encroaching on the single preocular, which does not reach the vertical. Two postoculars, superior larger; one temporal between fifth and sixth superior labials and occipital. Seven superior labials, eye cover third and fourth; postgeneials longer than pregeneials; nine inferior labials, fifth largest. Total length $39\frac{2}{3}$″, tail $10\frac{2}{3}$″.

Above olivaceous brown, each scale of the vertebral series with a black centre. End of gastrosteges and lateral scales to the edge of the fourth row, dark slate; a streak across the rostral plate through loreal and temporal re-

gion, and spreading in the posterior lower labials of the same color, yellow bordered above. Labials, mental and gular regions yellow, with blackish spots and vermiculations. A blackish spot on each end of every gastrostege anteriorly; posteriorly they become confluent with those of the sides. Abdomen yellow, immaculate.

Habitat.—Paysondu, Uraguay. Mus. Smithsonian, from Mr. H. W. Kennedy.

The genus here called Rhadinæa, has afforded me considerable perplexity, standing as it does in near relationship with Coniophanes, Coronella, Lygophis, and Diadophis. Its type is the Tæniophis v e r m i c u l a t i c e p s, which I indicated in 1861* as belonging to an unnamed genus. Coronella d e c o r a t a Gthr., is a second species. This I formerly placed provisionally in Diadophis, partly on account of its two preocular plates. A specimen from Vera Cruz, has, however, but one, and the dentitition is not isodont, but syncranterian, as Günther describes, though of a weak type. The same arrangement is exhibited by the v e r m i c u l a t i c e p s and p o e c i l o p o g o n. The tail of the d e c o r a t u s is relatively much longer than that of the v e r m i c u l a t i c e p s; the p o e c i l o p o g o n is rather intermediate in this respect. The dentition distinguishes this genus from Coniophanes; the pattern of coloration is the same, and the scale pores are equally wanting. The general form is rather more slender. If we ignore the difference in dentition, these serpents might be referred to Lygophis, where some species are of similar scutellation, proportion, and coloration. The closest accordance with Coronella in structural characteristics exists, but the species are much more slender, and the head is more distinct. If we unite them with that genus, Coniophanes, its closest ally (through C. i m p e r i a l i s) must follow, and if so, then Lygophis and Liophis, whose connection with Dromicus is well known. Coronella a n o m a l a is probably Lygophis r u t i l u s, with abnormal scutellation, and the dentition described. as syncranterian; it seems to be diacranterian in the specimens described under the last name; other specimens have or have not the interval anterior to the last long tooth. Whether this species is a Lygophis or a Rhadinæa, or whether it renders the two inseparable, must be left at present to future investigation. Its form is more slender than Coronella.

If Coronella, as Günther left it in his "Catalogue," could be defined trenchantly from genera leading to such distant connections, it would be well to accept it; but to me it is a union of natural groups, which, as being the most definable, may be called genera. They are Coronella proper, Macroprotodon†, Coniophanes, Rhadinæa, Lampropeltis, and perhaps others.

In the system of the Erpetologie Générale, the species of Rhadinæa would enter the section of Leptophis, characterized by smooth scales.

Rhadinæa o b t u s a, Cope, sp. nov.

Muzzle broadly rounded, rather short. Head small. Tail one-fourth the total length. Head plates shorter than in the p o e c i l o p o g o n; outlines of vertical slightly concave. Eight superior labials, loreal nearly square, encroaching on the single preocular, which does not reach the vertical. Two postoculars touching one temporal. Scales in nineteen longitudinal rows. Total length 41·25″, the tail 8·75.″

Above olive brown; ends of gastrosteges and sides, including border of fifth row of scales, blackish; a median dorsal band embracing one and two half rows of scales, which disappear on the tail. Beneath saffron yellow; a blackish dot on the end of each gastrostege anteriorly. Chin and labial regions immaculate.

Habitat.—Paysondu, Uraguay. Dr. Kennedy's collection furnished also that rare species Tomodon o c e l l a t u s. This serpent looks much like a Tachy-

* Proc. A. N. S., p. 74.

† It would prove interesting if the Coronella b r e v i s Gthr., should be found to possess the elongate anterior mandibular teeth of Macroprotodon.

menis, and resembles that figured by Seba, pl 68, no. 6, on which Klein (Tentamen, p. 39.) founded his Coluber exetra, aquaticus. There were also in the collection Lygophis anomalus, Heterodon d'orbignyi (ground color of abdomen and tail red!). Philodryas schottii, Oxyrhopus spadiceus, plumbeus, Opheomorphus doliatus.

Gonatodes gillii Cope, sp. nov.

Premaxillary teeth eleven. Inferior labials four; symphyseal thrice as large as the anterior labial, longer than broad, each of its two posterior sutures shorter than its lateral, and joining at an obtuse angle. Six scales in the first transverse mental row, two median in contact with symphyseal; behind these about four rows of hexagonal scales, becoming smaller and more circular. Superior labials five. Internasals separated by one row of scales. Frontal scales larger than gular, much larger than dorsal, which equal occipital. Scales of abdomen and anterior faces of limbs larger, rounded, imbricate; of tail large, hexagonal; a row of plates beneath. Length from muzzle to vent 3″.

Lateral regions bluish grey, sides of abdomen much darker. Dorsal region nearly black, with a median yellow vitta extending from the end of the muzzle.

Habitat.—Trinidad. From the collection of the well-known zoologist, Prof. Theodore Gill, whose name I take much pleasure in attaching to this very pretty species.

I have employed Fitzinger's name for this genus, instead of Goniodactylus of Kuhl, which should be applied to that called Cyrtodactylus by Gray.

Gonatodes ferrugineus Cope sp. nov.

Premaxillary teeth eleven. Inferior labials five; superior six or seven. Symphyseal as broad as long, twice as large as anterior labial. Two large scales in first mental row, five in the second, five rows behind these gradually diminishing in size. About thirteen longitudinal rows of scales on the thorax. Scales of the upper surfaces very small, those of the front large. Length from muzzle to vent 3‴.

Color cinnamon; the thorax and abdomen dirty white, the gular region mottled with the same.

Habitat.—Trinidad. Prof. Gill's Collection.

The head of this species is rather narrower than that of the gillii, and the squamation of the superior surfaces more minute.

Diplodactylus unctus Cope, sp. nov.

Scales rounded, flat in about 36 rows on the dorsal region; those of the muzzle smaller than dorsal, little larger than those on the occiput. Internasals in contact. Seven superior labials, including that under the pupil; six inferior, to the same point,—the last two very small, the first larger than the second, extensively in contact with the first pair of mental plates, which bound the symphyseal posteriorly. Each of the former is bounded by three smaller, and these are succeeded by a few rows which diminish in size. Terminal discs with straight outlines. Tail without tubercles. Anal scales similar to the abdominal. Auricular opening as long as pupil. Premaxillary teeth five. Length from end of muzzle to auricular meatus 12‴, from the same point to vent 4·5″.

Above grey, shining, with five broad, blackish, centrally-pale cross-bands, from base of tail to interscapular region. A dark band from the muzzle through the eye, a cross band on occiput, and various irregular spots on the top of head and labial regions.

Habitat.—Cape St. Lucas, Lower California. Sent to the Smithsonian Institution by John Xantus, Esq. (No. 5304.)

Phyllodactylus xanti Cope, sp. nov.

Dorsal tubercles rather small, not trihedral, in very irregular, broken, lon-

gitudinal series. Those on the occiput small, numerous, smaller than the scales of the front and region of the canthus rostralis, which are swollen, and as large as those of the abdomen. Gular scales minute. Symphyseal acute-angled posteriorly, bounded by the two oval, large mentals; each of these bounded by three posteriorly. Five inferior labials opposite the middle of the orbit; first and second equal. Seven superior labials to the same point. Internasals in contact. Preanals like abdominals. Transverse series of keeled ovate tubercles on the tail, which are in contact or separated by one row of scales. A row of broad plates beneath.

Length from muzzle to angle of ramus mandibuli 1·4″, to vent 5″. From vent to end of tail 4″.

In spirits gray, with five blackish cross-bands, the median line pale, continuous. A narrow streak through loreal and temporal regions, a cross streak on occiput, and a few longitudinal lines on the head. Tail with seven blackish rings.

Habitat.—Cape St. Lucas, Lower California. Obtained by John Xantus, Esq., to whom it is dedicated.

Pantodactylus bivittatus Cope, sp. nov.

Internasal pentagonal, as broad as long. Anterior supraorbital largest, not equal to the two others combined; the latter are as large as the fronto-parietals. Interoccipital larger than occipital, bounded behind by a small post-interoccipital and two larger postoccipitals; one or two large temporals. Nasal subtriangular, nostril on the middle. Loreal much higher than long; seven superior labials, eye over fourth. Four narrow inferior labials. One postsymphyseal, four infralabials, the two anterior pairs in contact. The anterior pair of gulars in contact, the four succeeding separated by from one to three plates, the following six in contact, transverse, the posterior forming the edge of a collar. Four rows of abdominal plates, as broad as long, two of ovate, smooth laterals, eighteen of elongate sharply-keeled dorsals. The extended posterior extremity reaches the elbow of the appressed anterior. Five femoral pores, four large anals, the posterior twice as long as the anterior. Tail more than twice the length of the head and body. Total length 11·7‴, tail 8·2.

Above olive brown; two yellowish brown bands from the temporal region, bounded with darker above and below; in one specimen a median blackish line. Below olivaceous yellow, olive spotted under the tail.

Habitat.—Paysondu, Uraguay, whence Mr. H. W. Kennedy has sent it to the Smithsonian Institution, Washington. This species possesses a transparent inferior palpebra like that of the concolor. (vid. Tschudi, "Die Familie der Ecpleopoda"), while in the orbignyi it is squamous.

Cnemidophorus hyperythrus Cope, sp. nov.

External nares in the nasal plate. Brachium with four series of plates, three on the antebrachium, the superior largest. Head rather narrow, muzzle long. Hind foot two-fifths the length of the head and body. Three rows of scales on the gular fold, the anterior row median, short, scales of the posterior largest. Posterior gular scales small, abruptly separated from the anterior, which are large—the median twice the size of those surrounding. Supraocular plates four, rarely three. Abdominals in eight series—sometimes additional small external plates. Frontoparietals united. Three larger anals.

From end of muzzle to collar, 1″ 8‴; from collar to vent 4″; vent to end of tail 14″.

Above brown or blackish; two (?) yellow bands on each side, which extend some distance on the tail, one from the superciliary margin, one from inferior border of orbit; the last bordered with blackish beneath, and extending on the posterior extremity to the foot; the caudal portion continued from a

similar band on the posterior face of the limb. A median light stripe between these two. Two paler median dorsal bands which diverge on the nape, and are frequently united for most of their length. Beneath iridescent rose-color, deeper posteriorly, becoming brownish vermillion on the under surface of the tail.

Habitat.—Cape St. Lucas. From coll. of Jno. Xantus, Esq., (No. 5290). A species allied to the d e p p e i Wiegm. in scutellation; the latter has two frontoparietals three supraoculars, is stouter, and more numerously banded.

Cnemidophorus m a x i m u s Cope, sp. nov.

Plates of the collar graduating in the posterior gular, the marginal largest, the series concave anteriorly in the middle. Anterior gulars abruptly larger, their median largest. Nostril in naso-rostral; supraorbitals four, frontoparietals separated. Interoccipital (in adult) nearly as broad as long; occipitals large. Preanals in four transverse series, the posterior two containing six. Tibials four, femorals seven, abdominals eight, antebrachials (often an unreliable character) four, brachials seven rowed. Dorsal scales minute.

Length from end of muzzle to gular fold 4″; from gular fold to vent 8″; from vent to end of tail 22″.

Above olive brown, with three brown bands on each side, which are as wide as the intervals between them, and are so broken by spots of the ground-color as to resemble series of confluent brown variations. Posterior extremities coarsely reticulate with the same color. Superior surface of tail, and gular region, blackish, varied; abdominal shields black tipped. Under surface of tail and hinder extremities yellow.

Habitat.—Cape St. Lucas. Jno. Xantus. (Smith. Mus., No. 5297).

Differs from the C. g r a h a m i i, its nearest ally, in its smaller and more numerous preanal plates, much smaller dorsal scales, and broader light bands.

Cnemidophorus m e l a n o s t e t h u s Cope, sp. nov.

Plates of the collar small, the marginal not the largest; posterior gulars graduating into the anterior, not abruptly separated from them; the median of the latter not abruptly larger than those around them. Nostril in the frontonasal plate, as in all other North American species. Four supraorbitals, two frontoparietals; interparietal elongate. Sides of neck with many folds. Scales of the back flat, rather large. Five large anals, two of which are marginal. Hind foot entering length of head and body three times; extended, reaching angle of the mouth. Eight series of abdominal scales. Length from muzzle to collar 3″; collar to vent 6″, 3‴; vent to end of tail 27″.

Above olive brown, with numerous whitish spots arranged closely in irregular transverse series, producing a reticulate aspect. Thorax and terminal two-thirds of tail, black; abdomen slightly, gular region strongly shaded with the same.

Habitat.—Region of the Colorado of California. Mus. Smithsonian, (3064 a); obtained by Mr. H. B. Möllhausen, of Lieut. J. C. Ives' expedition which explored that river.

This species has a shorter hind foot than the g r a c i l i s, (where it enters the length of the head and body two and a half times,) and does not exhibit that abrupt transition from the small posterior to the large anterior gular plates. The latter character separates it from t e s s e l a t u s and t i g r i s. In the former of these the dorsal scales are larger; in the last, the coloration is very different.

Uta t h a l a s s i n a Cope, sp. nov.

Form much depressed. Median dorsal scales larger, smooth, graduating into the lateral, smaller than those of the abdomen, not separated by median smaller ones. Abdominal scales nearly rectangular, in transverse series. Brachial scales a little larger, more imbricate, keeled. Occipital plate large,

longer than broad, triangular, with rounded angles, separated by two plates from those bounding supraorbital region. One series of interorbitals. Supraoculars in three series, five in the interior largest. Internasals, two series of four, each followed by two pairs. Scales of the collar but little larger than those anterior; gular scales equal. A narrow entire suborbital. Eight superior labials, bounded above by two series of similar plates. Eight oblong inferior labials. Symphyseal larger, followed by two trapezoid infralabials. A scapuloinguinal dermal fold on each side. Extended posterior extremity reaching anterior border of ear orifice. Tail broad and depressed at base, slender and slightly compressed, less than twice the length of the head and body. Total length, 21″ 4‴; tail 13″ 6‴; body 5″ 5‴; from collar to end of muzzle, 2″ 3‴.

Color above sea-green; a narrow black cross-band separates the nuchal from the dorsal region; a broader black band, which presents a convexity anteriorly, crosses the latter anterior to its middle. Between these, some indistinct undulatory bands, three similar on the posterior dorsal region, followed by numerous caudal annuli, which become very broad. Beneath, bluish green, darkest on the gular region; tail and femora beneath yellow.

Habitat.—Cape St. Lucas. From Mr. Xantus' valuable collections. Smithsonian, No. 5302.

Sceloporus z o s t e r o m u s Cope, sp. nov.

Scales large, strongly keeled, slightly denticulate, in ten longitudinal rows on rump and nape, and eighteen to twenty transverse between those points. Lateral scales larger than abdominal, not granular above and before shoulder. Auricular scales much longer than those adjacent. Cephalic shields smooth; prefrontal longer than broad, single; supraoculars in one series, transverse, posteriorly in immediate contact with superciliary series. Abdominal scales emarginate, accumulated on the posterior gular region, where many are tricuspid. Hind limb extended, reaching orbit.

Length from muzzle to vent, 9″ 7‴; from muzzle to axilla, 4″ 3‴; hind foot, 3″.

♂ Above bright olivaceous, with a reddish longitudinal dorsolateral band on each side, crossed medially by numerous indistinct brown bars,—often obsolete. Under surface and sides of tail yellowish. Anterior face of femur, groin, a large spot anterior to brachium, a broad band connecting the latter with the former, and the latter of each side, across posterior gular region, black, which shade into blue on the sides and throat. Chin light-green. Brachium black in front. In younger specimens the prebrachial spot often does not connect with the lateral abdominal band.

Habitat.—Cape St. Lucas. From the collection of Jno. Xantus, Esq.

A species to be compared with the S. c l a r k i i, which is found in Texas and Arizona. The latter has a shorter prefrontal plate, greater size, and different coloration.

Cyclura (Ctenosaura) h e m i l o p h a Cope, sp. nov.

Ctenosaura sp., Baird, Proc. A. N. S., 1859, p. 300.

Breadth just anterior to orbits equal to length from line connecting those points to end of muzzle. Rostral plate twice as broad as high, upper outline an arc. Seven premaxillary teeth; maxillaries (in one specimen) 21, of which six are conic, the third longest, and very few of the remainder more than tricuspid. Crest highest on the nape, where it is composed of high compressed processes; on the anterior fourth of the back they become reduced to a median series of compressed scales, which are undistinguishable behind the middle of the back. Dorsal scales flat; tibials and antebrachials slightly keeled. Tail cylindrical, the whorls with very strong spines, separated by one series of scales. Foot short, sole not spinous. Length from end of muzzle to gular fold, 6″ 5‴; from mastoid to mastoid, 3″; from edge of

fold to vent, 17″ 5‴; vent to end of tail, 33″; posterior extremity, 13″ 4‴. Above, light-greyish olive, with or without some transverse yellowish shades. Three or four black blotches cross the crest, the anterior smallest, the second also only a spot, but larger, the third transverse, the last largest, extending behiud the axillar round the thorax, which, with the gular region and anterior extremities, is also black. A black line on each side the nape. Posteriorly pale, vermiculated and speckled with black, the hinder extremities coarsely. Abdomen olivaceous grey or yellow, sparsely speckled. Tail yellowish-brown, with broad brown anuuli posteriorly.

Habitat.—Cape St. Lucas. One of the most interesting discoveries of Mr. Xantus, (Xantus Col., No. 789.) This very distinct species belongs to the same section as C. teres and C. pectinata. Its remarkably short crest and peculiar coloration are distinguishing features which immediately strike the eye.

Descriptions of New Species of Birds of the Families VIREONIDÆ and RALLIDÆ.

BY GEO. N. LAWRENCE.

Fam. VIREONIDÆ.

1. VIREOSYLVIA ATRIPENNIS.

First primary absent, third and fourth equal and longest, fifth nearly as long, second and sixth shorter and equal.

Upper plumage olive-green, brownish on the crown of the head; a broad line of greyish-olive runs from the bill over and beyond the eye; under this line is a blackish mark, occupying the lores and a space behind the eye, including the eyelids; cheeks greyish-olive, bordered by a well-defined blackish line, running from the lower mandible down the side of the neck; tail greyish-black, broadly margined on the outer webs above with olive-green, and with the inner webs underneath edged with pale yellowish-white; quills black, edged with olive-green; under wing coverts pale yellowish white, inner margins of quills greyish-white; throat greyish-white; breast and abdomen pale yellowish-white, olivaceous on the sides; under tail coverts pale yellowish-white; upper mandible dark horn-color, the under paler; tarsi and feet black. Length of skin $6\frac{3}{4}$ in.; wing $3\ \frac{3}{16}$; tail $2\frac{3}{8}$; bill $\frac{5}{8}$; tarsi $\frac{3}{4}$.

Habitat.—Sombrero Island, W. I.

It somewhat resembles *V. altiloqua*, but is apparently a stouter species, the bill is rather larger and stronger, although not so broad at the base, the throat is grey instead of white, but the most distinguishing character is the black quill feathers.

This species was the only land bird in a small collection put in my hands for examination by Prof. C. A. Joy, of Columbia College, N. Y. These birds were collected by Mr. Alexis A. Julien, on the Guano Island of Sombrero, one of the easternmost of the group, known as the Virgin Isles. I expect to receive from him a more extended series of the birds inhabiting that island, and to give a catalogue of them, should they prove of sufficient interest.

Fam. RALLIDÆ.

2. CORETHRURA GAUTEMALENSIS.

Adult.—Upper plumage brownish-rufous, brighter on the wings, and more brown on the head; tail dark rufous-brown; quills dark liver-brown, with faint edgings of rufous; the under plumage is of a deeper and brighter brownish-rufous, lighter on the chin; sides dusky; under wing coverts dusky-brown; bill dark horn-color, pale at the end; the legs appear to have been flesh-color.

A younger specimen has the plumage above not quite so bright, and the under of a lighter brown, ashy on the middle of the abdomen and on the throat.

Length to end of tail about 8 in.; wing $4\frac{5}{8}$; tail 2; bill 1; tarsi $1\frac{3}{8}$.

Habitat.—Guatemala.

3. ARAMIDES AXILLARIS.

Chin and throat white, entire head besides, neck, breast and abdomen, of a bright chestnut-red, lighter on the sides of the head; lower part of abdomen and thighs dark greyish-cinereous; upper part of back bluish-cinereous, middle of back olive-green; rump deep chocolate-brown, deepening to brownish black on the tail coverts; tail deep brownish-black; primaries bright cinnamon-red, slightly dusky at their ends; the secondaries are liver-brown on their inner webs, and on the outer greenish olive-brown; the tertials and wing coverts are of the same color as the back; under wing coverts and axillaries black, narrowly banded with white; sides under the wings and under tail coverts brownish-black; bill dusky-olive on the sides for two-thirds its length, the remainder yellowish white; legs and feet clear vermilion, of a rather light color, and in the specimen before me translucent.

Length about 13 in.; wing $6\frac{3}{4}$; tail $2\frac{3}{8}$; bill $1\frac{5}{8}$; tarsi $2\frac{1}{8}$.

Habitat.—Barranquilla, New Granada, collected by Geo. Crowther, Esq.

The toes of this species are short, and together with the tarsi, quite slender. It does not appear to resemble any of the described species that I have examined.

Description of New Species of NORTH AMERICAN PEDIPALPI.

BY DR. H. C. WOOD, JR.

SCORPIUS ALLENII.

S. saturate brunneo-castaneus, lævis, venuste politus; cephalothorace antico distincte emarginato; palpi modicis; manibus magnis, subquadrangulatis, latis, vix crenatis, sparse punctatis; digitis robustis, modice brevibus, fere rude punctatis, curvatis; oculis lateralibus fere æqualibus; cauda breve, valde crenulata; spiculo brevissimo, subuncinato, sine spinulo basali; pectinis dentibus fere 7.

The dorsum is beautifully polished, and not at all tuberculate. The palpi are of medium size. The second joint has all of its borders, except the postero-inferior, crenulate. The third has only its supero-anterior crenate. Its anterior face is complanate; its posterior convex. The hands are rather thin, somewhat cordate, subquadrangular, and faintly marked with divisions between eight facets. The anterior border is thin and convex. The fingers are very robust, almost rudely punctate, rather short, and ornamented with a few long hairs. Their opposing margins are minutely denticulate. The tail is short; in the female not so long as the body. The first joint is broader than long. It has both the superior and the supero-lateral crests crenulate. The third and fourth have also the infero-lateral distinctly crenate. The inferior crests are crenulate on the fourth. The penultimate joint is elongate; its lower surface is tuberculate; its single median inferior and infero-lateral crests strongly dentate. The terminal joint is elongate; its superior surface is complanate and triangular; its inferior convex, and marked with a dark median stripe. The sternal plate is pentangular. It affords me great pleasure to dedicate this species to my friend and co-laborer, Dr. H. Allen, U. S. A.

Length of body, ♂ 6 lines, ♀ 9 lines: of tail, ♂ 8 lines, ♀ 8 lines.

Hab.—Lower California. Smithsonian Museum. J. Xantus de Vesey.

BUTHUS EXILICAUDA.

B. dilute aurantiaco-brunneus, interdum obscure maculatus; dorso tuberculis parvis asperato; cephalothorace antico late sed haud profunde emargi-

nato; palpi nonnihil gracilibus, subelongatis; manibus parvissimis; digitis valde elongatis, gracilibus, curvatis; cauda gracile, nonnihil elongata; spiculo modice longo, valde curvato, sine spinulo basili; pectinis dentibus fere 18.

The cephalothorax is medianly canaliculate, and anteriorly broadly but very shallowly emarginate. The lateral eyes are arranged in a straight or nearly straight series. The palpi have their surface quite rough, and are somewhat elongate and slender. The second article has four minutely crenulate crests, besides minute tubercles on its anterior face. The third has five ridges, besides larger tubercles on its front surface. The anterior aspect of the hand is very convex. The posterior border is ornamented by an obsoletely crenulate ridge. The opposing margins of the fingers are armed with obliquely longitudinal imbricated rows of minute teeth, with a series of distant larger ones on either side. The caudal surface is rough. The first joint has very minutely denticulate superior, supero-, median, infero-lateral, and inferior ridges. The next three articles have the same crests, excepting the median lateral. There are generally no distinct ridges on the penultimate segment. The last joint is short, and very narrow, but quite thick. Its superior aspect is not complanate; its inferior is strongly convex. The lower surface of the tail is generally marked with a median longitudinal stripe. The sternal plate is triangular, with its apex truncate.

Length of body, ♂ 7 lines, ♀ 8 lines: of tail, ♂ 13 lines, ♀ 12 lines.

Hab.—Lower California. Smithsonian Museum.

B. HIRSUTUS.

B. brunneus; palpi, pedibus caudaque dilute aurantiacis, longe pilosis; cephalothorace lato, margine antico non solum haud emarginato sed etiam convexo; oculis lateralibus in serie valde curvata dispositis; palpibus crassibus, marginibus nonnihil crenulatis; manibus modice tumidis, obsolete septemplicatis, marginibus posticis anticisque tuberculatis; digitis valde elongatis, robustis, curvatis, obsoletissime plicatis; pectinis dentibus 25—30; abdomine nonnihil læve, haud carinato; spiculo sine spinulo basali.

The common tint of the dorsum is a very dark reddish-brown, but it varies greatly, in some specimens being as light as the legs, in others even olive. In the typical pattern, whilst the penultimate caudal segment is of the same reddish-brown as the body, the terminal is very light. The cephalothorax is broad, and has its surface minutely granulate. The median furrow is strongly pronounced, and is intersected by three transverse crosses. The most anterior of these crosses is at the position of the median ocelli; the most posterior just in front of the hinder margin. Rarely these are somewhat obsolete, and sometimes they are slightly oblique. The opposing edges of the fingers are armed with obliquely longitudinal imbricated rows of small teeth, with a series of larger distant ones on each side. The surfaces of the abdominal scuta are quite smooth, but their posterior borders are tuberculate. Anteriorly they are impressed with two crescentic linear furrows. The legs are compressed and hairy; their edges are more or less crenulate. The tail is long, massive, rough and very hairy. At the proximal end of each of the first four joints, there is a pair of broad, thin, minutely denticulate articular processes. On the distal extremity of the fourth there is a nondenticulate pair. The superior, supero and median lateral crests of the first four articles are strongly but irregularly crenate. The median is evanescent, on each, anteriorly. The inferior and infero-lateral ridges are smooth on the two anterior joints, on the third they are slightly, on the fourth distinctly crenate. The supero and median lateral crests of the penultimate segment are strongly crenulate; the infero lateral and median inferior strongly denticulate. The last joint is short, swollen and very hairy. Its articular processes are large, but not dentate. Its superior surface is triangular, smooth and complanate, or even depressed; its inferior is tuberculate, and traversed by two grooves on each side.

Length of body, 1 5-8 inches: of tail, 2 5-8 inches.
Hab.—Lower California. J. Xantus de Vesey. Smithsonian Museum.

B. EMARGINATICEPS.

B. olivaceo-fulvus; palpi, pedibus caudaque longe pilosis; cephalothorace antico late et profundissime emarginato, sed alibi, B. hirsuti illo simillimo; palpibus crassibus; marginibus nonnihil crenulatis; manibus modice tumidis, obsolete septemplicatis, marginibus anticis posticisque tuberculatis; pectinis dentibus 30; abdomine nonnihil lævi, medio haud carinato; spiculo sine spinulo basali.

The color of our single specimen is an olive-yellow tint, with a very dark crescentic blotch at the position of the median eyes. But in this pattern it does not differ from some individuals of the preceding species. The cephalothorax differs from that of *B. hirsutus* only in one character: In its anterior border is a very large emargination, which reaches about one-third of the distance to the median eyes. The abdomen is precisely like the preceding species. The tail is perhaps a little less massive. But it also so closely resembles that of *B. hirsutus* the description of one will answer for the other.

Length of body, 1 5-8 inches: of tail, 2 5-8 inches.
Lower California. J. Xantus de Vesey. Smithsonian Museum.

B. EUSTHENURA.

B. aurantiaco-brunneus; dorso tuberculis minimis asperato; cephalothorace haud emarginato, medio canaliculato; oculis lateralibus utrinque in serie curvata dispositis; palpi gracilibus longis, longe sparse pilosis; manibus parvis, haud tumidis, subcylindraceis; cauda modice longa, percrassa; spiculo brevissimo, valde curvato, sine spinulo basali; pectinis dentibus fere 17.

The surface of the cephalothorax is rough and uneven. The hands are very small and smooth, with some traces of the eight facets so distinct in *B. punctipalpi*. The fingers are about as long as the hand, rather slender, with their opposing margins armed with a row of very sharp, minute teeth, and much larger ones placed at intervals on one side of their distal portion. The legs are somewhat compressed; very long and slender. The tail, when compared with the body, is very heavy. On the first four joints the superior and supero lateral crests are alone serrulate. The superior terminates in a spine, feebly pronounced on the fourth article. The inferior and infero lateral crests are distinct, but not crenulate. The penultimate segment has well-marked, but not crenate, supero and infero lateral ridges, besides a single median inferior and median lateral on their proximal portion. The terminal joint resembles that of *B. punctipalpi*, but is much larger and thicker, and not so prolonged posteriorly. Sternal plate pentangular.

Length of body, ♂ 7 lines: of tail, ♂ 13 lines.
Hab.—Cape St. Lucas. J. Xantus de Vesey. Smithsonian Museum.

B. PUNCTIPALPI.

B. aurantiaco-brunneus; dorso tuberculis minimis asperato; cephalothorace medio canaliculato, antico nonnihil emarginato; palpi dense minutissime punctatis, nonnihil robustis; manibus magnis, tumidis, octo faciebus indistincte instructis; cauda modice longa et crasse; articulo penultimo longo, ultimo parvo, supra complanato; spiculo gracillimo, valde elongato, gradatim curvato, sine spinulo basali; pectinis dentibus fere 20.

All of our specimens are immaculate; some of them shade off in color towards an olive. The lateral eyes, three in number, are generally arranged in a slightly, but occasionally in a strongly curved line. The cephalothorax, and, indeed, the whole dorsum is roughened by very numerous minute tubercles. The scuta are more or less distinctly medianly keeled. The joints of the palpi are irregularly parallelopipedal, with their margins mostly well-

defined and crenulate. The second joint has on its anterior face one or two crenate ridges; its posterior margin is rounded off. The hands are large, and have only their superior and inferior edges distinctly crenate. The fingers are robust and moderately long, with their opposing margins armed with a single row of teeth, with larger ones at regular intervals on one side of their distal portion. The feet are compressed. The tail is rather robust. The first three joints have their superior and supero lateral ridges sharply serrate, and terminating posteriorly in a spine. In the fourth they are the same, except that the terminal spinule of the supero-lateral crest is wanting. The first four joints have infero lateral and inferior crests, the former mostly distinctly, the latter indistinctly (excepting on the posterior segment) serrulate. The penultimate articulation is long, and armed with distinctly serrulate supero-lateral, infero-lateral crests, as well as a single median inferior; and on its anterior half, central lateral ridges. Its form is that of a parallelopipedon thinned at its two extremities. The superior surface of the last joint is triangular and complanate; the inferior is convex. The sting is very long, slender, and gracefully curved. The sternal plate is pentangular.

Length of body, ♂ 10 lines, ♀ 12 lines: of tail, ♂ 16 lines, ♀ 14 lines.

Hab.—Cape St. Lucas. J. Xantus de Vesey. Smithsonian Museum.

B. SPINIGERUS.

B. dilute olivaceo-fulvus, fusco vitatus; cephalothorace antico haud emarginato, medio canaliculato; oculis lateralibus in serie curvata positis; palpi modice robustis, marginibus valde crenulatis; manibus nonnihil tumidis, lineis elevatis obsoletis; digitis nonnihil elongatis, modice curvatis, marginibus opponentibus et dentatis et crenulatis; abdominibus mediis nonnihil carinatis; cauda modice breve, robustissima, lineis elevatis denticulatis; spiculo sine spinulo basali; pectinis dentibus 20—25.

The color of this species varies; generally each abdominal plate has a dark brown v or w shaped marking, forming a continuous stripe on each side. This is obsolete on the cephalothorax. But this distinctness of pattern is often lost, and the whole body involved in an olive-brown tint. The palpi closely resemble those of *B. boreus*, but have the hand not so large, and the facets and elevated lines not so strongly pronounced. The opposing margins of the fingers resemble those of that species in their armature, but want the wavy outline. On each side of the abdominal median line are numerous small black tubercles, so arranged as to form more or less prominent ridges. There is also a series of these on the posterior border of each of the abdominal scuta. The legs and tail are of a dirty yellow color. The anterior four caudal joints are short and very robust, the breadth of the first three often equalling their length. These four joints are provided with denticulate superior and supero-lateral crests. In the anterior three these are of nearly the same length, and terminate distally in a small spine. In the fourth, the dorsal is only two-thirds the length of the other raised line, and the joint is then scooped out to the level of the latter, which does not end in a spine. On the first four articulations the middle lateral crests are almost entirely obsolete. On the fifth they are more strongly pronounced. This joint is much more elongate than the others. Its supero-lateral crests are not so strongly denticulate as those of the others, and have no spine at their distal extremity. The infero-lateral and inferior crest exist on the first four joints as four black, occasionally somewhat obsolete, ridges, but are not crenulate. On the fifth both the inferior-lateral and the single median-inferior crests are denticulate. The sixth caudal joint is somewhat ovate, flattened above, and without ridges. On the lower surface there exists a faint mesial groove. The sting is slender and strongly curved.

Length of body, ♂ ♀ one inch; of tail, ♀ one inch, two lines; ♂ one inch, four lines.

Hab.—Texas. Smithsonian Museum.

CENTRURUS PHALODACTYLUS.

C. brunneo-fulvus; cephalothorace sparse punctato, medio leviter canaliculato, antico et abbreviato et rotundato et nonnihil emarginato, postico transverse sulcato; manibus caudaque venuste politis et pedibus nonnihil pilosis; palpi robustis, angulis vel valde crenulatis vel denticulatis, articuli tertii superficie antica spinulo unico (interdum duobus); manibus valdissime tumidis, longis, indistincte octoplicatis; digitis latis, robustissimis, modice brevibus, curvatis, marginibus opponentibus acute denticulatis; pedibus flavis; abdomine læve; cauda breve, cristis superioribus obsoletis, superficie superiore nonnihil minute granulata; articulo quarto haud carinato; articulo ultimo maximo, spiculo parvo sine spinulo basali; pectinis dentibus 7–9.

The cephalothorax is not produced as far anteriorly as is commonly the case. It is impressed with a faint transverse groove at the position of the median ocelli, and with another, more distinctly defined, on its posterior third. These channels separate three pairs of slightly pronounced elevations, which successively decrease in size from the first. The first joint of the palpi has all of its margins armed with distinct obtuse denticules, excepting only the postero-inferior, which is rounded and concave, and crenate only on its proximal third. The third article is much larger than the second, and has only its anterior margins crenate. Its posterior surface, as well as that of the hand, is sparsely and irregularly punctate. The anterior aspect of the hand is minutely tuberculate. The first joint of the mandibles is very long, almost always extending as far forward as the cephalothorax, and often much beyond it. The distal portion of these organs, with the "pincers," is black. The median eyes are placed upon a single black elevation in the middle third of the cephalothorax. The first two lateral ocelli are somewhat smaller than the median; the third is much smaller; the fourth is at right angles to the third, and is still less. The three anterior joints of the tail are short and rather broad. Their superior crests are entirely, and their supero-lateral almost, obsolete; their inferior and infero-lateral are well-marked and broadly crenate. All of the ridges of the fourth segment are obsolete. The penultimate joint is elongate and slender. Its lower surface is rough, and has two strongly, but obtusely denticulate infero-lateral, and a single, median-inferior crest. The last segment is immensely swollen. Its distal portion is suddenly and very strongly contracted, and then inflated slightly again, so as to form a knob, as it were, on the base of the sting.

Length of body, $1\frac{1}{4}$ inches; of tail, $1\frac{1}{4}$ inches.

Hab.—Utah Territory. Smithsonian Museum. M. McCarthy, Esq.

PHRYNUS ASPERATIPES.

P. dilute aurantiacus saturate rubido-brunneo maculatus; cephalothorace lato, reniforme, abdomineque tuberculis parvis sparsis et granulatis minutis numerosis asperatis; palpi magnis latis, nonnihil semi-cylindriaceis; articuli secundi superficie antica et spinulis parvis numerosis et uno vel duobus majoribus armata; articuli tertii margine superiore spinis 4, inferiore spinis 5; articuli tertio quartique superficiebus posticis tuberculis parvis spinosis in seriebus rectis dispositis armatis; illius margine superiore ulterius spinis maximis 3 et 2–3 modicis instructo; margine inferiore spinis magnis 2 et 2–3 parvis armato; articulo quinto spina maxima unica et spinulis modicis duobus instructo; femoribus tuberculis spinosis numerosis asperatis.

The color of our single specimen is a very light orange. The cephalothorax has a median longitudinal sulcus distinct anteriorly, but evanescent posteriorly. A short distance behind the centre of the cephalothorax is a well-defined transverse groove, extending nearly across one-third of its breadth. Posterior to this, and connected with it by the median sulcus (here very well marked), is a transverse furrow similar to the other, but only about one-third its length.

The three sulci are of a dark-brown tint. Besides these, there are on each side of the cephalathorax four dark, but more or less obsolete grooves. At the position of the lateral eyes on each side there exists a dark-brown spot, and between them and the anterior transverse groove is a pair of similarly colored round depressions. The maxillary palpi are of a more decided orange than the body. The second joint has its anterior face armed with eight or ten very small spines or spinous tubercles, and one or two larger ones. The spines on the lower margin of the third joint are longer than those on the upper. On each, the two nearest the body are much larger and more closely approximated than the others. Between the margins are a few very small spinules. The spinous tubercles on the upper portion of the posterior surface are more numerous than those on the lower. The fourth joint is dilated superiorly in its distal portion: where on the upper margin are placed three very long acute spines, with two or three much smaller ones. The lower margin has five spines, three of them being much smaller than the other two. The moveable finger is very long and acute. The upper surface of the abdomen has along the mesial line a double row of dark-brown spots, and on either side a series of blotches of the same color,—one on each scutum. The legs and sides of the abdomen are very rough. The under surface of the abdomen is smooth.

Hab.—Lower California. Smithsonian Museum. J. Xantus de Vesy.

May 5th.

The President, Mr. Lea, in the Chair.

Twenty members present.

The following paper was presented for publication:

On the Lestris Richardsoni, etc. By Elliott Coues, M. D.

May 12th.

The President, Mr. Lea, in the Chair.

Sixteen members present.

The following papers were presented for publication:

Synopsis of the Marine Invertebrata collected by the late Arctic Expedition under Dr. I. I. Hayes. By Wm. Stimpson.

Descriptions of the soft parts and embryonic forms of one hundred and forty-three species of Unionidæ of the United States. By Isaac Lea.

New Exotic Unionidæ. By Isaac Lea.

May 19th.

Mr. Vaux, Vice-President, in the Chair.

Twenty members present.

The Secretary announced the death on the 3d inst., of Col. Mark W. Collet, M. D., aged 36, late a member of the Academy.

The following papers were presented for publication:

Contributions towards a Monography of the Pholadacea, etc., No. 2 By Geo. W. Tryon, Jr.

Descriptions of new species of Fresh Water Mollusca, from Panama. By Geo. W. Tryon, Jr.

Description of a new Exotic Melania. By G. W. Tryon, Jr.

Descriptions of new species of fresh water Mollusca, &c. By Geo. W. Tryon, Jr.

Notes on the Birds of Jamaica. By W. T. March, with remarks, by S. F. Baird.

On a third kingdom of organized bodies. By T. B. Wilson, M. D., and John Cassin.

Descriptions of fourteen new species of Melanidæ and one Paludina. By Isaac Lea.

May 26th.

The President, Mr Lea, in the Chair.

Nineteen members present.

On Report of the respective committees, the two papers of Mr. Lea, read May 12th, were ordered to be published in the Journal, and the following were ordered to be published in the Proceedings:

On a Third Kingdom of Organized Beings.

BY THOMAS B. WILSON, M. D., AND JOHN CASSIN.

The classification of the lower forms of organized beings, on the assumption that they ought to be assigned to either the animal or the vegetable kingdom, has presented difficulties to naturalists which have proved insurmountable. The position of entire groups remains, apparently, as uncertain and undetermined in this respect as it ever was, and the conclusions and opinions of authors are so various that it is palpable that no considerable approach has been made to the solution of the questions involved, notwithstanding much very careful and accurate investigation and patient research. The difficulty probably originates in the first assumption, that all organized or living beings are referable to two great groups only, an assumption and presupposition of almost universal prevalence, but in which men of science seem to have been contented to adopt popular belief and to accept the usual and popular application of language. There are, very probably, three kingdoms or great primary groups of organized beings, as distinct from each other as any subordinate groups and as readily defined by valid and recognizable characters.

Whatever may be the solution, ultimately, of the very important questions relating to the primary, and at present unknown, principles under which the normal and inherent forces of Nature first assume that mysterious tension or condition, of which life is the immediate result, it is evident and unmistakable that this extraordinary tension manifests itself and operates under such controlling laws that its results are determinate and uniform. Taking on themselves isolation from the great mass of inorganic Nature, though temporarily only, these forces assume developments which are circumscribed and specific, though evidently progressive and modified under circumstances coincident with and dependent upon the laws or conditions of existence of organic life in any geologic period. It has hitherto been assumed, apparently, that from a point of the first manifestation of life, its progress of evolution or development is into two series or great classes of existences,—animal and vegetable,—or perhaps into one series only, according to the hypotheses of the older authors, regarded as the chain of being, from the lowest vegetable to

the highest animal. In our opinion it may be demonstrable, that the first assumption of life manifests itself in objects constituting a primary great class or kingdom of more simple organization than either the animal or vegetable kingdom, and possessing also an equally characteristic specialization in its structure and functions.

The consideration of the question of determinable characters on the assumption of the existence of two primary divisions or kingdoms only may now safely be regarded as exhausted, without conclusive result or an approximation to such, sufficient even to obtain general adoption temporarily as a probable antecedent hypothesis, awaiting demonstration. Much has been attempted and numerous propositions and theoretical definitions have been thoroughly canvassed, to the end only of showing their insufficiency. Voluntary motion and permanent fixedness, the presence or absence of nitrogen, internal or external stimuli, the differences in the method and substances of nutrition, and many other problems have, in their attempted solution, failed to give the desired formula, and there are those who may be presumed to be well acquainted with all the researches touching questions here alluded to, who infer summarily that there is no difference radically, or in the lowest forms of organization in the two kingdoms *Animalia* and *Vegetabilia*, as almost universally supposed to be constituted. As an example, we cite the distinguished botanist Professor Lindley, of London, who says, in the Introduction to his standard and well known work on the Natural System of Botany, "Plants are not separable from animals by any absolute character, the simplest individuals of either kingdom not being distinguishable by our senses," (p. 15, New York, 1831). Of a somewhat similar tenor, but with an implication more in accordance with our views on this hitherto intricate subject, is an observation by Professor Owen, of the British Museum: "Nothing seems easier than to distinguish a plant from an animal, and in common practice, as regards the more obvious members of both kingdoms, no distinction is easier; yet, as the knowledge of their nature has advanced, the difficulty of defining them has increased, and seems now to be insuperable." (Hunterian Lectures, p. 2, London, 1855.)

Inthe higher developments of the animal and vegetable kingdoms there is truly the utmost possible readiness of distinction, and this great facility seems to have led to an inference that the same readiness and facility ought to prevail throughout the two supposed kingdoms. "At first sight," says Professor Van der Hœven, "it seems easy to distinguish an animal from a plant, and even the most unskilled person thinks he has a clear notion of the difference. Yet it is just his want of knowledge that causes the difference to appear so prominent, whilst he overlooks the intermediate links, and thinks, for instance, of a dog and a pear tree," (Handbook of Zoology, i. p. 4, Cambridge, 1856). We do by no means admit, however, that the principle here implied and apparently involved, which seems to be that the higher groups of any grade, whether kingdoms or other, are more easily recognizable and definable than the lower, is correct. The truth is, very probably, that the lower forms in all groups, are, at least, as readily to be assigned to their proper positions in the natural system as the higher; possibly more so, in some instances. In the two kingdoms, *Animalia* and *Vegetabilia*, there is no difficulty with forms properly belonging to either of them, and of either high or low grade of development. The difficulty and, in fact, impossibility hitherto has been with organizations inferior to both, and properly belonging to neither. Though in an early zoological epoch the corals and other groups may have been regarded as of doubtful status, there is at present no group in either the animal or vegetable kingdom, rightly defined, which, in our opinion, presents any doubt or difficulty in its being assigned to either one or the other, and, probably, very generally, nearly correctly according to its actual or relative characters and its affinities.

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There are clearly recognizable characters distinguishing the two primary divisions, or first duality of natural productions, organic and inorganic bodies, or, as Linnæus judiciously terms them, *corpora organisata* and *corpora congesta*, and all the subordinate groups and species of either, necessarily possess characters in common, though exhibiting themselves in degrees of modifications vastly diversified and numerous. In the former, or great organic division, the definition of the common characters are of course implied in the term organic, and on the degrees and modifications of organization, whether indicating what may be termed higher or lower development; whether clearly marking or only obscurely indicating inferior groups of whatever grade or value; or whether presenting very prominent or very obscure modifications, with or without apparent object or relations—on these degrees or modifications of organization or structure rest all classification, and all the great primary facts of independent existences, as presented to the human faculties, whether of observation or reason. We hold it to be altogether probable, and perhaps demonstrable, that all groups, of whatever grade or position, possess positive or relative characters dependent on, and exponating their degree of organization, and which characters absolutely establish and advertise their status in Nature. We hold, too, that all such groups admit of description, and equally absolute or relative definition in language. Such is, and has always been, the practical faith of naturalists, whatever their theories, the accuracy of their observations, the extent and precision of their knowledge, or their deficiencies in either, and this faith is very probably quite truthful, and immutably founded on one important aspect of the relations of the external universe to the human mind, mutually questioning and responding, calling to each other and answering gladly, as it were, like an echo. All the processes of naturalists, systematic or descriptive, are based on the assumption of the practicability of definition, and of groups, and of species alike. Any other course, or any other assumption, would be assuredly unreasonable and illogical, and destructive to the advancement of knowledge and of science. "We must trust the perfection of the Creation so far," says a distinguished author, "as to believe that whatever curiosity the order of things has awakened in our minds, the order of things can satisfy." (Nature, an Essay, by R. W. Emerson.)

The organization of all beings, of which life is the essential character, seems to present three very distinct grades or specializations of development, and apparently indicates a classification based on such specialized development or the characteristic organs and functions of each grade. In our opinion the specialized organs and functions in each of these grades of development present sufficient and exclusive characters, admitting of being defined and applied readily as the real characteristics of three great primary divisions or kingdoms of Nature. The term, specialized, has been used by Professor Owen with reference to the two kingdoms, Animal and Vegetable, and in nearly the same sense that it is used by us. He says, most truly: "But the two divisions of organisms, called 'plants' and 'animals,' are specialized members of the great natural group of living things." (Palæontology, p. 4.) The three great groups which we hold to be the primary divisions or kingdoms of organic life, present, essentially as characters or specializations of development, the prominence, or dominant prevalence of the Reproductive System, the Nutritive System and the Nervous System and their functions.

The organs and corresponding functions which seem to characterize these three kingdoms, and to become specialized and dominant in the organization of each, are as follows:

1. Organs for the continuation of the species, the function of which is Reproduction.

2. Organs for the preservation of the individual, the function of which is Nutrition.

3. Organs for external relations and self-consciousness, the function of which is Sensation.

The Reproductive and Nutritive functions are common to all organized beings, and so, probably, also is the Sentient function, though manifesting itself only in an incipient or rudimentary manner. The Reproductive function, however, beginning with mere cellular conjugation, becomes specialized first in a great group of organized beings of more simple structure than either Vegetables or Animals, which we regard as eminently and demonstrably a primary division or kingdom, and apply to it the name *Primalia*. In this kingdom organs of Reproduction are temporarily formed, and no other. In the *Vegetabilia*, those organs become of greatly increased importance, though not permanent, and in the *Animalia* they present a still higher organization, and in the higher sub-kingdoms attain permanency of structure.

The Nutritive function, beginning also in the cellular structure of our kingdom *Primalia*, is in that group quite rudimentary, so far as relates to specialization of organs, but in the kingdom *Vegetabilia*, this function and the organs performing it, especially the organs of respiration and circulation, become specialized and assume an extraordinary degree of development. Ascending to the kingdom *Animalia*, the organs of Nutrition become more numerous and more highly organized in their structure, but the organs of Respiration are not developed to such extent as in the *Vegetabilia*.

That the Sentient function is also common to all organized bodies is presumable, or to be inferred only, from the fact that it is manifested in greater or less degree in the two first kingdoms, *Primalia* and *Vegetabilia*, in sensibility to light, to thermal or to meteorological influences, and occasionally to other external influences. It is, however, generally held by Anatomists, but not without exception, that no organs of sensation are demonstrable in either our group, *Primalia*, or in the *Vegetabilia*. In the kingdom *Animalia*, and in that kingdom only, these organs are palpably most highly developed and specialized in the Nervous System. We recapitulate our views in the form of a corollary :

1. The Reproductive organs are first specialized in the kingdom *Primalia*.
2. The Nutritive organs are first specialized in the kingdom *Vegetabilia*.
3. The Sentient organs are first specialized in the kingdom *Animalia*.

The possession of an organization exclusively providing for Nutrition and Reproduction characterizes the first and most simple forms of life. This organization for Nutrition and Reproduction, and these functions only, is the especial character of the first of the three primary divisions or kingdoms of organized beings, the kingdom which we have named *Primalia*. In that group there are no other organs than those performing the function of Reproduction, and the structure is exclusively cellular without vascularity ; or, perhaps it may be more properly stated to consist of mere unicellular aggregation. The possession of organs for, and the first development of the function of Reproduction is the specialization of this kingdom.

The next great division or kingdom is marked by the high development of the organs performing the functions of Nutrition and the superposition or superaddition of organs providing for the co-operative or identical functions of Respiration and Circulation. The possession of organs providing for Nutrition and Reproduction, Respiration and Circulation, and these only, characterizes the great group of Vegetables or kingdom *Vegetabilia*. In this group the vascular structure appears for the first time and continues to characterize it in all its modifications. The possession of organs for performance of the function of Nutrition in its highest development is the specialization of the kingdom *Vegetabilia*.

The last or most highly organized kingdom presents an exclusive and pecu-

liar character in the nervous system and its sphere of functions, embracing all the operations and relations of the senses and of the muscular system, superadded to the organs and the functions of the two preceding groups. The possession of organs for Nutrition and Reproduction, Circulation and Respiration, and for Sentiency, Voluntary motion, and all other functions and relations of the Nervous System, characterizes the great kingdom *Animalia*. Its specializations is the possession of and the high development of the Nervous System.

In imitation of the Linnæan formula these three kingdoms may be characterized as follows:

Animalia, corpora organisita, generantia, spirantia et sentientia.

Vegetabilia, corpora organisita, generantia, spirantia, *non sentientia*,

Primalia, corpora organisita, generantia, *non spirantia*, *nec sentientia*.

As above intimated, the difficulty in the hitherto attempted definitions and in the systematic arrangement of the kingdoms *Animalia* and *Vegetabilia*, on the antecedent supposition that these two kingdoms ought to include all organisms that now exist, or have ever existed, has arisen from the impossibility of incorporating indisputably into either, many of those belonging to our third kingdom, *Primalia*. It is composed of orders and classes of existences, of which some have been very generally assigned to the Animal, and others to the Vegetable kingdom; and others again which have been variously and doubtfully regarded as belonging to one or the other. All organisms included in this kingdom are of cellular structure only, and possess the functions of Nutrition and Reproduction, as above defined, and no other; and all the groups properly of this kingdom are, in our opinion, readily demonstrable, as having a greater degree of relationship to each other than to any groups whatever in the other two kingdoms. This circumstance is held, very properly, as of the first importance in all classifications. With this first, but quite independent great group recognized and understood, there is, very probably, no difficulty whatever in readily defining not only the three great groups of organized beings, existing in Nature, but all subordinate groups belonging to either. We regard our third group as a Kingdom, and of the same rank or grade in classification as the two great groups which are universally admitted by naturalists under that designation.

It is now a matter of common information to men of science that all organized existences are composed of, and resolvable ultimately, by anatomical and microscopical analysis, into cells, and that the cellular structure prevails as a primary form or basis of organization alike in the most simple and in the most complicated organisms. Those cells seem to be the very first forms of organization and life, and possess a singularly independent vitality and power of increase or reproduction, whether isolated, or nearly so, or existing in any amount or form of aggregation in the higher vegetables or animals. They seem to be even capable of assuming, or re-assuming, individual and independent existence after having been previously and originally merged or aggregated in the vascular structure of the two higher kingdoms, *Vegetabilia* and *Animalia*, as well as in the lower non-vascular kingdom, *Primalia*. This seems to be the case in what are termed animal and vegetable infusions.

The organisms constituting the kingdom *Primalia* are essentially to be regarded as aggregations of cells entirely capable of nutrition and propagation, or increase, but without any part of their structure being traceable as vascular in any degree. These organisms are the primary forms of life and organization, and have not the distinctive characters or "super-additions," as termed by Professor Owen, of London, of either plants or animals. "When a certain number of characters concur in the same organism," says that learned gentleman, "its title to be regarded as a 'plant,' or an 'animal,' may be readily and indubitably recognized; but there are very numerous living beings, especially those that retain the form of nucleated cells, which manifest the common organic characters, but without the distinctive superadditions of either

kingdom. Such organisms are the *Diatomaceæ*, *Desmideæ*, *Protococci*, *Volvocinæ*, *Vibriones*, *Astasiæ*, *Thalassicolæ* and *Spongiæ*, all of which retain the character of the organized fundamental cell, with comparatively little change or superaddition."—(Hunterian Lectures, p. 8, London, 1855.)

It is, in our opinion, quite expedient and reasonable to inquire whether either of the groups here mentioned, or any other, *can* possibly belong to the Animal or Vegetable Kingdom, without possessing "the distinctive superadditions of either." The indication in our opinion, is quite clear that these groups really do not belong to either, but to a third kingdom, not possessing, and definable without, those superadditions, and which we have above designated. In his "Palæontology," a work of later date than that just quoted, Professor Owen seems to have finally concluded that the forms mentioned in the above citation do not belong to either of the kingdoms *Animalia* or *Vegetabilia*, and consequently he groups them into a kingdom for which he adopts the name *Protozoa*, (from Professor Goldfuss, Handbuch der Zoologie I. p. xi. Nurnberg, 1820,) and says, "But the two divisions of organisms called 'plants,' and 'animals,' are specialized members of the great natural group of living things, and there are numerous beings, mostly of minute size, and retaining the forms of nucleated cells, which manifest the common organic character, but without the distinctive superadditions of true plants or animals. Such organisms are called '*Protozoa*,' and include the Sponges or *Amorphozoa*, the *Foraminifera* or Rhizopods, *Polycystineæ*, the *Diatomaceæ*, *Desmidiæ*, *Gregarinæ*, and most of the so-called *Polygastria*, of Ehrenberg, or infusorial animalcules of older authors."—(Palæontology, p. 4, and Index, p.v.)

The very appropriate term *Protozoa* is admissible for the group designated by Professor Owen, though the group or kingdom is very much restricted by him, and different from the group defined by Professor Goldfuss, and of entirely different grade or value. The latter learned naturalist divides all organized beings into two sections, which he does not name, but which are the same as the divisions now well known as the *Vertebrata* and *Invertebrata* of Cuvier. He arranges the whole into eleven classes, of which *Protozoa* is the first, and *Mammalia* the eleventh class. The division of the class *Protozoa* is into four orders, *Infusoria*, *Phytozoa*, *Lithozoa* and *Medusinæ*, which embrace sixteen families, or four families each, and include in the aggregate what must now be regarded as a very heterogeneous group, properly to be distributed into all three of the organized kingdoms. The *Protozoa* are regarded by Professor Goldfuss as true animals. Professor Owen adopts the name for his group as restricted, quite properly, according to the usages of naturalists, the whole of it having been previously included in his class *Protozoa* by Professor Goldfuss.

We have been thus particular in alluding to the term *Protozoa*, admitting its excellence, and willing to express freely our regret that we do not consider it proper to adopt it as the name of our first kingdom, on account of its having been applied originally to a group very different in all particulars. The kingdom now proposed by us, and which, in our opinion, is a natural and primary division, is composed of the following inferior groups:

1. Kingdom Primalia.
   1. Sub-Kingdom Algæ.
   2. " Lichenes.
   3. " Fungi.
   4. " Spongiæ.
   5. " Conjugata.

All of these groups are composed of organisms which are non-vascular and without organs of Respiration or Circulation; and the kingdom *Primalia* contains all such organisms known to exist in Nature. But a comparatively small number of those belonging to our group *Primalia* are arranged by Professor Goldfuss in his Class *Protozoa*, but we regard it as containing the whole of the

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Kingdom *Protozoa* of Professor Owen, and other large groups, as above designated.

The evident and insurmountable difficulty in arranging well known groups of inferior organization on the preconceived idea of the existence of two kingdoms only, and that those inferior groups must belong to one or the other, has led several naturalists into suggestions and propositions relating to a third kingdom, or other group of high grade. Usually, and, in fact, in nearly all instances, those suggestions take the form of mere intimations, or rather doubtfully expressed opinions that a third group is possible, and in the large majority of cases the intimation relates to the supposed existence of forms and groups intermediate between animals and vegetables. Occasionally doubts are clearly stated as to the propriety of regarding some specified forms as belonging to either of the two great groups commonly received, and in a few cases the division of organized nature into three great primary groups, or kingdoms, has been proposed and presented in detail.

The proposition of M. Bory de Saint Vincent is one of the most clearly defined. That distinguished naturalist, in "Dictionnaire Classique D'Histoire Naturelle," (vol. viii. p. 246,)* establishes an additional intermediate kingdom which he denominates "Regne Psychodiaire," and gives his conclusions on the existence of this third, but intermediate, kingdom in a very lucid and satisfactory manner, and with entirely judicious and proper minuteness of detail on such an important proposition. His views are mainly based on the fact that some organisms assume, at periods or stages of their existence, characters of both animals and vegetables, or, as he expresses himself, even of animals and minerals. He says: "Tous ces êtres qui sont à la fois, des Animaux, des Plantes ou des Minéraux, et qui ne peuvent conséquemment rentrer d'une manière exclusive dans l'un des trois règnes adoptés jusqu'ici, ne doivent-ils pas former un règne nouveau dont plusieurs naturalistes ont déjà réclamé l'établissement, et que nous avons le premier proposé de fonder sous le nom de Psychodiaire." In volume xiv. of the same work, (Dictionnaire Classique,) M. de Saint Vincent fully defines and expresses his conclusions in relation to his proposed new kingdom, (p. 329). He divides it into three classes, to which he applies the names "les *Ichnozoaires*, les *Phytozoaires* et les *Lithozoaries*," the first of which groups embraces "les Polypes nus de Cuvier," and the second and third, the groups of organisms previously known as *Zoophytes* and *Lithophytes* as his proposed names indicate. Mainly the kingdom *Psychodiaire* of M. de Saint Vincent is identical with the Class *Protozoa*, of Prof. Goldfuss and subsequent authors, the difference being essentially that the former regards his proposed kingdom as a great group, equal in grade to the kingdoms *Animalia* and *Vegetabilia*, and intermediate between the two, while the latter regards his group only as a class of the Animal kingdom, and the first and least complex in organization of his eleven divisions of the grade of classes.

This is, so far as our knowledge extends, the first arrangement or classification in Natural History in which three primary groups of organized beings are distinctly proposed. M. de Saint Vincent also proposes an additional inorganic kingdom, which he names the "Règne Ethéré."

In an article in the "Edinburgh New Philosophical Journal," vol. xii. new series (p. 216,) "On the distinctions of a Plant and an Animal, and on a fourth kingdom of Nature," by Mr. John Hogg, a British Naturalist, who has devoted much attention to the lower organisms, that gentleman proposes the name "*Primigenum*" for the group established by Professor Owen, under the name "*Protozoa*." He does not, however, propose any change in the classes,

*The date on the title page of this volume is 1825, but it is quoted and referred to by M. de Saint Vincent himself in Encyclopedia Methodique, supplementary volume on "Hist. Nat. des Zoophytes," which is dated 1824 (p. 657). His views are most fully expressed, subsequently, in Dict. Class., vol. xiv. p. 329 (1828).

or other constituent groups of the "Kingdom *Protozoa*," as defined by Professor Owen. He says: "The word *Protozoa*, i. e. first or early animals, which was formed by a foreign naturalist, can alone include those that are admitted by all to be animals, or *zoa*, which are already members of and included in the kingdom Animalia, and not those concerning which it is doubtful whether they be not rather plants, or *phyta*." The "*Regnum Primigenum*," according to Mr. Hogg, contains "all the lower creatures, or the primary organic beings—'*Protoctista*'—both *Protophyta*, or those considered now by many as lower or primary beings, having more the nature of plants, and *Protozoa*, or such as are esteemed as lower or primary beings, having rather the nature of animals." He alludes, however, exclusively to the groups mentioned by Professor Owen, previously cited in this paper as constituting his "Kingdom *Protozoa*."

The idea of intermediate groups partaking of the nature of both animals and plants has been very extensively entertained, and from it seems to have originated such terms as *Zoophyta*, *Phytozoa*, and others of similar meaning, adopted from ancient authors. Generally, however, in the older authors the allusion is mainly to *forms* only as intermediate, but there are numerous expressions in the works of naturalists of all times, which show a suspicion that organisms exist which are not to be regarded properly as either animal or vegetable in their structure and nature. The well known expression of Pliny is to this purpose: "Equidem et his inesse sensum abitror, quæ neque animalium, neque fructicum, sed tertium quamdam ex utroqne naturam habent: urticis dico et spongiis." (Nat. Hist., Book ix. chap. 68.) This paragraph has attracted much attention.

The great descriptive and literary naturalist, Buffon, frequently expresses opinions on this subject, from which are the following:

"Mais, comme nous l'avons déjà dis plus d'une fois, ces lignes de séparatiou n'existent point dans la Nature, il y a des êtres qui ne sont ni animaux, ni végêtaux, ni minéraux, et qu'on tenteroit vainement de rapporter aux uns ou aux autres;" . . . . "comme on veut absolument que tout être vivant soit un animal ou une plante, on croiroit n'avoir pas bien connu un être organisé si on ne le rapportoit pas à l'un ou à l'autre de ces noms généraux, tandis qu'il doit y avoir, et qu'en effet il y a une grande quantité d'êtres organisés qui ne sont ni l'un ni l'autre." (Vol. iv. p. 252, Paris, 1776.)

This celebrated author previously had expressed himself in a manner generally coinciding and consistent with the preceding paragraph. We cite earlier passages from the same volume, not only for our present purpose, but incidentally, as singularly illustrative of the very small progress on this subject from that time to the present:

"Cet examen nous conduit à reconnoître évidemment qu'il n'y a aucune différence absolument essentielle & générale entre les animaux & les végétaux, mais que la Nature descend par degrés & par nuances imperceptibles d'un qui nous paroît le plus parfait à celui qui l'est le moins, & de celui-ci au végétal." (Vol. iv. p. 8.)

"On peut donc assurer avec plus de fondement encore, que les animaux & les végétaux sont des êtres du même ordre, & que la Nature semble avoir passé des uns aux autres par des nuances insensibles, puisqu'ils ont entr'eux des ressemblances essentielles & générales, & qu'ils n'ont aucune différence qu'on puisse regarder comme telle." (Vol. iv. p. 9.)

The learned Daubenton also has occasional or incidental observations of a similar purport, the following of which is one of the most remarkable:

"Les polypes, l'acétabule, les animaux des infusions n'ont-ils pas une organisation assez différente de celle de la plupart des animaux pour avoir un autre nom? Les conserves, les champignons, les moisissures, les lichens sont-ils de vraies plantes? Je pourrois rapporter ici beaucoup d'autres observations qui tendent à prouver qu'il y a une très-grande quantité d'êtres organ-

[May,

isés que ne sont ni de vraies plantes, ni de vrais animaux. Ce n'est qu'à force d'observations et de méditations que l'on pourra distinguer clairement les vraies plantes et les vrais animaux des autres êtres organisés qui en diffèrent assez pour avoir une autre détermination et un autre rang dans la division méthodique des productions de la nature." (Séances des Ecoles Normales, tome v. p. 277.)

We cite these authors only for the general purpose of illustrating the usual style of the suggestions and opinions frequently to be met with. Purposely, at present, we do not extend extracts of this description, nor give any such from living authors.

On the LESTRIS RICHARDSONI of Swainson; with a Critical Review of the Subfamily LESTRIDINÆ.

BY ELLIOTT COUES, M.D., U.S.A.

In the year 1831, a Jäger was described and figured in the Fauna Boreali-Americana, under the name of "*Lestris Richardsoni* Swains." This bird has been generally supposed to be the true *parasitica* of Brünnich, in the now well known *fusco-unicolor* state of plumage which all the species of *Stercorarius* pass through in arriving at maturity. Consequently, the name "*Richardsoni*" has been employed for the common Jäger, especially by American writers, to the exclusion of the prior name "*parasitica*," of Brünnich.

Examination of the works of Temminck, who, at the time in which he wrote, probably knew more about Jägers than almost any author, will show how this misapplication of a name became general.

In his edition of 1820, he is acquainted with but a single species of *Lestris*, (besides *catarractes* and *pomarinus*,) which he calls "*parasitica* Brünn." His description of the latter is made up of a mixture of the characters of *parasitica* and *Buffoni;* and the synonyms of the two are indiscriminately adduced.

In his edition of 1840, he recognizes the distinctions between the two species *parasitica* and *Buffoni;* but, unfortunately, he calls the true *parasitica* "*Richardsoni*," adducing the proper synonyms of the species under that name; while he describes the true *Buffoni* under the name of "*parasitica*." He is thus fully aware of his mistake of 1820; for (page 498) he makes the following "*Remarque :* Comme notre article du stercoraire parasite ou labbe du manuel p. 796, renferme, ainsi qu'il vient d'être dit, les synonymes de deux espèces distinctes, (le stercoraire à filets subulés courts, et le stercoraire à longs filets,) il est necessaire de refaire en totalité toutes les indications sur ces deux espèces."

But, believing Swainson's bird to be the same as the *parasitica*, he says (page 492), in defence of the nomenclature adopted: "Shortly after the publication of the second edition of the Manual, of 1820, we became aware of the error in our article on *Lestris parasitica*, where the description and synonymy of two distinct species are confounded. Guided by Boie's observations, we had applied the name *parasitica* to the small Jäger with short tail feathers, proposing to adopt for the one with long tail feathers (the labbe à longe queue of Buffon,) the name *Buffoni;* but since some English authors,* led into error by our article, have thought that they have discovered in our *parasitica* a new species, which they call "*Richardsoni*," we are obliged to adopt their mistake, sanctioned as it is by several naturalists, and in many collections. Being, then, confident that *Lestris Richardsoni* is really the same with our *L. parasitica*, with short tail feathers, . . . we adopt here the first of these names for the short-tailed Jäger, leaving to the long-tailed species

* i. e., Swainson, and others.

the appellation of *parasitica;* for we take it, names and priority of discovery are not of the last importance; all that is necessary is to be understood when we talk of species; and for this purpose, a name sanctioned by usage, and which does not cause confusion, is far better than one which has nothing to recommend it but its priority of date."

It was by this somewhat heterodox reasoning on the subject of nomenclature, that Temminck adopted for the common Jäger the name of "*Richardsoni*," and turned over the name "*parasitica*" to the long-tailed species. His example has been very generally followed, as will be seen by consulting the synonyms given in this paper. I am inclined to the opinion, however, that Swainson's bird may be a distinct species from the old *parasitica* of Brünnich, upon the following grounds:

In the very extensive series of Jägers in the Museum of the Smithsonian Institution, there are several specimens which agree among themselves in the possession of some characters which differ considerably from those of the typical *parasitica*. The whole bird is considerably larger,—the difference in the wing from the flexure amounting to nearly or quite an inch, and proportionate discrepancies existing in the tarsi and toes. The bill is longer, (though not stouter;) its nail longer compared with the ceral portion, and its convexity more gradual. The most marked features, however, lie in the tail. While the relative proportions of the lateral feathers to the central pair are much as in *parasitica*, the whole tail is longer, more graduated, and the individual feathers somewhat broader. From the insertion to the tips of the pair of feathers next the central, measures in *parasitica* about $5\frac{1}{2}$ inches; in "*Richardsoni*" about $6\frac{1}{2}$. A proportionate difference exists in the absolute total length of the central pair; though their relative lengths do not differ appreciably. The tail of the specimens under consideration is more graduated,—the amount of graduation being nearly an inch, instead of about half an inch, as in *parasitica*. The central pair seem broader than in *parasitica*, and somewhat of a different shape; and the same may be said, though less markedly, of the lateral feathers. Comparing some of these specimens which are in the dusky stage with the corresponding state of plumage of *parasitica*, I find the dusky to be much darker,—in fact, quite of a blackish rather than of a fuliginous hue. No other differences are appreciable.

These specimens agree minutely with the plate and description of what Swainson called "*Richardsoni*," so that there cannot be the slightest doubt of the propriety of referring them to that species. The only question is, are the differences above detailed sufficient to constitute specific distinctions?

Bonaparte, in his Conspectus, ii. page 209, gives a form or variety of *parasitica* thus: "*α. L. coprotheres* Brünn.; *Richardsoni* Swains. . . ex bor. Eur. et Am. Omni tempore et ætate obscurè unicolor." Swainson's figure also represents the bird in this *fusco-unicolor* stage; he perhaps thinking that this feature formed a distinctive character. This, however, cannot be the case; and I wish to be distinctly understood as throwing this out of consideration altogether in discussing the claims of the bird to specific distinction, since it is now certain that this dusky stage is merely an evidence of immaturity; and that the bird, when adult, will have the white neck all round, and white underparts, exactly as in *parasitica*. If it is to be separated at all, this is to be done upon the grounds of the differences in size and proportion above detailed,—without the least reference to the dusky stage of plumage in which it is figured by Swainson.

While I am not thoroughly satisfied of the entire propriety of so doing, I shall, in the following Review of the subfamily, separate it specifically from the *parasitica;* desiring to call attention to it, as at least a well-marked form, not a distinct species.

General Considerations.

Before proceeding to speak in detail of the individual species of the *Lestridinæ*, I desire to make a few remarks on the points which at the present day must be taken more especially into consideration, in carrying on an investigation of this subfamily of birds.

Although the contrary was formerly the case, yet at the present time the species of Jägers are pretty definitely ascertained,—being better known, in fact, than the species either of *Larinæ* or *Sterninæ*. This arises partly from the fact of the small number of existing species, and partly because most of the species present really very marked differences, which can hardly be overlooked by any one examining specimens with an ordinary degree of mental acumen. With the amount of knowledge which we possess at present, it would be quite impossible to mistake *Buffoni* for *parasiticus*, etc., in whatever stages of plumage they may be found; and therefore, except in one or two instances, I have thought it quite unnecessary to present any lengthy description or specific characters, for the purpose of separating one species from another. In a paper like the present, such points seem quite uncalled for.

At the same time, there is a point concerning which authors are even now at variance, and which seems to have need of all the light that can be thrown upon it. I refer to the remarkable changes of plumage which the species of one of the genera of this subfamily,—*Stercorarius*,—undergo in arriving at maturity, and more particularly that perplexing state in which the bird is uniformly dusky. From the time when Brünnich, in 1764, institutes a *Catharacta* "*coprotheres*, corpore toto fusco," etc., and then adds: "An a præcedenti sexu vel specie diversa? A quibusdam hæc pro fœmina, illa §127 (*parasitica*) pro mare habetur,"—the question has been an open one. Some authors have made a distinct species of this stage; others have given it as a variety; others still have considered this plumage indicative of age, or of season, or of sex. Modern opinions have generally agreed in considering it as simply an evidence of immaturity, and not a variety, much less a distinct species. I hope I shall be able to show in the following pages, that this latter opinion is the correct one, even if I cannot prove exactly *what* age the dusky stage is characteristic of, or whether more than one sex participates in it. To this end, I have gone into detail regarding the various ages of two of the species,—*pomarinus* and *parasiticus*.

But there is still another point in the study of the Jägers, which, being a matter of more than ordinary difficulty, demands our most patient and careful investigation. This is the *bibliography* of the subfamily. Many of the species were known to the very earliest,—even pre-Linnæan,—writers on ornithology; and, as a natural consequence, the synonymy of the various species is as intricate, and in as puzzling a state of complication, as perhaps that of any other group of birds, rendering it a peculiarly difficult task to unravel the various knotty points which present themselves for our consideration. Fortunately, however, the synonymy of most of the species is rather intricate, than doubtful; rendering it possible, perhaps, to present a tolerably accurate list of references, by careful and patient study. To this part of the subject in hand I have paid special attention, and it is believed that the lists of synonyms given are pretty full, and include all the important references. Others must judge of the accuracy of the citations, each according to his own views of the subject.

If I seem to have made any uncalled for innovations in nomenclature, I can only offer as an apology, that it is impossible to conduct an investigation into the bibliography of the subfamily without seeing that many of the names in common employ must be superseded, provided we are to pay any attention to recognized laws of nomenclature.

Family *LARIDÆ*.

Subfamily LESTRIDINÆ.

Of this, the first subfamily of the *Laridæ*, there are at present known to exist eight species, belonging to two genera. Of these, five inhabit the northern, and three the southern hemisphere. The five northern species are all represented in North America. The following analytical table will represent the characters of the species and genera sufficiently well for our present purposes. The diagnoses are purposely made as brief as possible, only the most prominent features being noticed.

§ *Analytical Table of the Genera and Species of the Lestridinæ.*

I. Staturâ maximi, et formâ robustissimi. Pedes et rostrum validi. Tarsus brevior quam digitus medius cum ungue. Rectrices mediæ latæ vix ultrà cæteras porrectæ.....Genus BUPHAGUS.
  a. Rostri longitudo poll. 2, et ultrà; altitudo ·75. Ad anguli oris 3·00 poll. Ex maria arctica..... *B. skua.*
  b. Rostrum brevius, crassius. Ex maria antarctica..... *B. antarcticus.*

II. Staturâ minores, et formâ graciliores. Pedes et rostrum graciles. Tarsus non brevior quam digitus medius cum ungue. Cauda longior, et rectrices mediæ valdè ultrà cæteras porrectæ.....Genus STERCORARIUS.
  1. Tarsi posticè asperrimi. Rectrices mediæ latæ in apices ipsas.
    a. Rectrices mediæ cæteris 4 pollices longiores..... *S. pomarinus.*
  2. Tarsi posticè subasperi. Rectrices mediæ longæ, rigidæ, acuminatæ.
    a. Rectrices mediæ cæteris 4 poll. longiores..... *S. parasiticus.*
    b. Similis *S. parasitico;* sed major, caudâ totâ longiore, plus rotundata..... *S. Richardsoni.*
    c. Similis *S. pirasitico;* sed minor, rostro magis compresso, rectricibus mediis elongatis, apicibus rotundatis (Bp.)..... *S. Hardyi.*
    d. Similis *S. parasitico*. Sed etiam minor *S. Buffono;* rectricibus mediis lineari-acutis, rachide denudata rigida, pollice et ultrá cæteras superantibus (Bp.)..... *S. spinicauda.*
  3. Tarsi posticè subasperis. Rectrices mediæ longissimæ, flexibiles, filiformes.
    a. Rectrices mediæ cæteris 8 ad 10 pollices longiores....*S. Buffoni.*

Genus BUPHAGUS Moehring.

Buphagus, Moehring, Genera Avium, 1752, page 66, No. 71. Typus *Larus catarractes*, Linn.

Stercorarius, "Brisson," Vieillot, Nouv. Dict. d'Hist. Nat., 1817, 153. Typus idem. (Sed non verus *Stercorarius*, Briss. cujus typus *Larus parasiticus*, L. est.) Gray, Genera of Birds, 1849, 651. Degland, Ornith. Europ. 1849, ii. 287. Bonaparte, Conspectus Avium, 1856, 206. Lawrence, Gen. Rep. Birds N. A. 1858, 838; et aliorum auctorum.

Catharacta, Brünnich, Orn. Bor. 1764, 32. Typus *Cath. skua* Brünn. Bonaparte, Comparative List, 1838.

Larus, (partim) Linnæus, Systema Naturæ, 1766. Gmelin, Systema, Naturæ, 1788. Latham, Index Ornithologicus, 1790. Meyer et Wolf, Taschenbuch deutsch. 1810.

Catarractes, Pallas, Zoog. Rosso-As. 1811, ii. 308. Typus *C. skua*. Stephens, Shaw's Gen. Zool. xiii. 1825, 214.

Lestris, "Illiger," Temminck, Man. Orn. 1820—40. Typus *L. catarractes*. (Sed non verus *Lestris* Ill. cujus typus *L. parasitica* L. est.) Faber,

Prodromus Isl. Orn. 1822. Lesson, Traité d'Ornith. 1831. Keyserling et Blasius, Wirbelth. Europ. 1840; et auctorum aliorum.

Megalestris, Bonaparte, Conspectus Avium, 1856, p. 206. Typus *Larus catarractes*, Linn.

1. Buphagus skua Coues ex Brünnich.

"*Skua Hojeri*, Ray, Synopsis Avium, 128."

Larus fuscus, Brisson, Ornithologie, vi. 1760, p. 165. "Scopoli, Bemerk. Natur-Gesch. 1770, 90."

Catharacta skua, Brünnich, Ornithologia Borealis, 1764, 33. No. 125.

Catarracta skua, Retzius, Fauna Suecica, 1800, 161, No. 123. Bonaparte, Cat. Met. Ucc. Europ. 1842, 79. Bonaparte, Rev. Crit. Degland's Ornith. Europ. 1850, 202.

Catarractes skua, Pallas, Zoographia Rosso-Asiæ, ii. 1811, 309. Stephens, Shaw's Gen. Zool. 1825, xiii. 215.

Cataractes skua, Macgillivray, Man. Orn. ii. 1842, 255.

Catarractes vulgaris, Fleming. (fide Bp.)

Catarractes fusca, Leach. (fide Bp.)

Lestris skua, Brehm. (fide Bp.)

Larus catarractes, Linnæus, Systema Naturæ, i. 1776. Gmelin, Systema Naturæ, i. 1788, 603. Latham, Index Ornithologicus, ii. 1790, 818.

Larus keeask, Latham, Index Ornithologicus, ii, 1790, 818.

Lestris catarractes, Illiger, Prodromus, 1811, 273. Faber, Prodromus Island. Ornith. 1822, 102. Temminck, Manuel d'Ornith. ii. 1820, 792. Temminck, Manuel d'Ornith. iv. 1840, 494. Bonaparte, Synopsis, 1826, No. 304. Nuttall, Man. Ornith. ii. 1834, 312. Schlegel, Rev. Crit. Ois. Eur. 1844, 84.

Lestris catharactes, Brehm, Naturg. Europ. Vög. 1823, 739.

Lestris catharractes, Schinz, Europ. Fauna, 1840, i. 387.

Lestris catarrhactes, Kaup, Sk. Ent. Europ. Thierw. 1829, 64. Keyserling et Blasius, Wirbelth. Europ. 1840, i. 239.

Stercorarius catarrhactes, Vieillot, Nouv. Dict. d'H. N. 1817, xxxii. 154. Vieillot, Fauna Franç. 1828, 385. Degland, Orn. Europ. 1849, ii. 289. Gray, Genera Avium, iii. 1849, 652.

Stercorarius catarractes, Bonaparte, Consp. Avium, 1836, ii. 206. Lawrence, General Report Birds N. A. 1858, 838.

Stercorarius cataractes, Selys-Longchamps, Fauna Belg. 1842, 155.

Stercorarius catharractes, Des Murs, Traité d'Ool. Ornith. 1860, 551.

Stercorarius pomarinus, Vieillot, Galerie d'Ois. ii. 1834, 220; sed non Temm. nec auctorum!

Sp. ch.—Above blackish brown, more or less variegated with chestnut and whitish; each feather being dark-colored, with a spot of chestnut towards its extremity, which in turn fades into whitish along the shaft towards the tip of each feather. On the latero-nuchal region, and across the throat, the chestnut lightens into a decided reddish yellow, the white being as a well-defined, narrow, longitudinal streak on each feather. The crown, post-ocular and mental region have but little whitish. Inferiorly, the plumage is of a blended fusco-rufous, lighter than on the dorsum, with a peculiar indefinite plumbeous nuance. The wings and tail are blackish; their rhachides white, except towards the apices; the remiges and rectrices white for some distance from the bases. This white on the tail is entirely concealed by the long tail-coverts, but appears on the outer primaries as a conspicuous spot. The bill and claws are blackish horn; the feet pure black.

Bill from base to tip 2·10; to end of cere 1·20; gape 3·00; height at base ·75; width a little less; rami 1·60; gonys ·50; wing 16·00; tail 6·00; tarsus 2·70; middle toe and claw 3·10.

Habitat.—Seas and sea coasts of the northern hemisphere; more particularly in higher latitudes.

It is quite unnecessary here to go into any details regarding the specific characters of so long and well known a species, and one which is so very distinct both in form and colors from any other of our continent.

I am well aware that the adoption of the name under which I present this species, may be looked upon by many ornithologists as an unnecessary, or at least as an uncalled for innovation. In defence of the nomenclature adopted, I beg leave to offer the following considerations, which, it is hoped, will exonerate me from the charge of needlessly changing names, by proving that if we are to pay any attention to recognized rules of nomenclature, such a procedure is unavoidable in the present instance, and that no other name than the one adopted can be used:

In the first place, Moehring's genus *Buphagus* is certainly based upon a bird which was afterwards the *Larus catarractes* of Linnæus. His diagnosis (vide infra*) unmistakably refers to one of the *Lestridinæ*, while the species is fortunately exactly fixed by his reference to "*Hojeri*" and "*cataractes.*" Perhaps no one of his diagnoses is more definite than this one. This being the case, the only question is, are his genera to be adopted and used in ornithology?

I believe that the rule generally followed regarding Moehring's genera, is that they are to be adopted when they can be certainly identified, provided that they do not conflict with subsequent Linnæan appellations. Upon this principle, many of Moehring's old genera have been revived and adopted by Gray, and his example has been followed by Baird, and other ornithological writers. It is thus that such genera as *Philomachus*, *Collyrio*, *Trogon*, *Uria*, *Catarractes*, etc., have taken the precedence over more modern appellations, to which their priority entitles them. The rule, however, does not appear to have been so strictly carried out as it should be, if adhered to at all. Gray, for example, adopts *Stercorarius* of Brisson for the Jäger, remarking "that it is supposed to be *Buphagus* of Moehring." His procedure in this case is a little remarkable, since *Buphagus* is certainly identifiable; and there is no Linnæan genus with which it can conflict,—Linnæus ranging all the Jägers known to him with the gulls, under *Larus*. With this restriction, which, it must be confessed, is rather a compliment to Linnæus, than strict justice to other writers, the genera of Moehring are to be adopted when identifiable. The fact of that author not being a binomalist,—in fact, not dealing at all with species,—does not appear to be a valid reason why his genera should be neglected any more than those of Brisson for example. I am decidedly in favor of the adoption for any genus of the first appellation that is proposed for it after the date of the first published works of Linnæus, provided there be no conflict between them: considering the introduction of a definite form of nomenclature as beginning with that illustrious writer.

Now, supposing that we do reject Moehring's *Buphagus*, let us see what will be the consequence. "*Stercorarius* Brisson 1760" is the name which of late has been most generally applied to the genus in question. But the type of Brisson's genus is not the *catarrhactes*,† but the true *parasitica*, as is evident by his elaborate description, although no specific name is given; and hence, if it is to be used at all, it must be for the genus of which *parasitica* is typical. But Brisson was a polynomalist; and if we refuse to adopt Moehring's names on this score, Brisson's genera must also be rejected: to which procedure, of course, no naturalist would assent.

Catharacta of Brünnich of 1764 comes next in order, and has as its type

* *Moehring. Genera Avium*, 1752, page 66, No. 71. "*Rostrum* postice rectum, membrana callosa ad nares usque tectum, versus apicem incurvum, lateribus compressis. *Femora* extra abdomen. Digiti antici tres membrana intermedia toti cohærentes, posticus liber."

† Brisson, on page 165 of vol. vi. of his Ornithologie, ranges this species under *Larus*, calling it "Le Goeland brun, *Larus fuscus.*"

C. skua, which is the true *catarrhactes*. But here he is anticipated by Moehring, who had previously applied the name *Cataractes** to a genus of Guillemots, of which *Uria troile* is the type. This genus has been adopted for the latter birds, by Cassin, Bryant, and others; and, unless we admit the different spellings of the same word as distinct genera, which would seem quite unwarrantable, Brünnich's name must be superseded.

Lestris of Illiger (1811) being based upon the *parasitica*, I am aware of no other genera than the above, which were founded on the *Larus catarrhactes* down to 1856, when Bonaparte, in his Conspectus, proposed the name *Megalestris*. The choice then lies between Moehring's *Buphagus* and Bonaparte's *Megalestris;* and of the two, I prefer to take the former, especially as by so doing we shall be enabled to retain *Stercorarius* of Brisson for the other species of the subfamily.

Regarding the adoption of the specific name *skua*, I will merely remark that as Brünnich was as strict a binomialist as Linnæus himself, there is no reason why his specific names should not be employed in all cases when they are identifiable. The date of Brünnich's "*skua*" is 1764; that of Linnæus' "*catarractes*" is 1766.

It is a little surprising that Brisson, after instituting the genus *Stercorarius* for the Jägers, should be so far at fault regarding the proper affinities of the present species as to place it among the Gulls, under the name of *Larus fuscus*. His descriptions of all the Jägers are remarkably accurate, and so full and complete as to admit of the positive identification of all his names. In this case, and in numberless other instances, there is cause for exceeding regret that he was a polynomialist; for, had he been a strict binomialist, so that we could adopt his specific names, we should be saved a vast deal of uncertainty and profitless discussion as to the proper specific appellations to be employed.

The *Larus keeask* of Latham is certainly the present species. That author gives 22 inches as the total length, and 3 inches as the length of the bill,—dimensions which will apply to no species of *Stercorarius;* and there is no other *Buphagus* than the present inhabiting the northern hemisphere. His bird "habitat in America ad sinum Hudsonis."

The plate which Vieillot gives in his Galerie des Oiseaux, (1834) of his *Stercorarius pomarinus*, represents undoubtedly the present species; and is, so far as I am aware, the only instance of the application of the name *pomarinus* to any other species than that to which it rightfully belongs. This error seems the more surprising, since Vieillot, in 1817 and in 1828 (vide synon.), gives the species as *Stercorarius catarrhactes*.

The other synonyms of the species do not require special notice. I have endeavored to preserve the various spellings of the word *catarrhactes* by the different authors cited. I quote *Catarractes fusca* Leach, and *vulgaris* Fleming, and *Lestris skua* Brehm, on the authority of Bonaparte.

2. Buphagus antarcticus Coues ex Lesson.

Lestris catarractes, Quoy et Gaimard, Voy. Uranie, Ois. p. 38. Nec auct.
Lestris antarcticus, Lesson, Traité d'Orn. 1831, p. 606.
Stercorarius antarcticus, Bonaparte, Consp. Av. 1856, p. 207.

Diag.—B. *Buph. skuæ* similis; sed rostro crassiore et breviore.
Habitat.—Antarctic Ocean.

* This word affords a good illustration of the very various cacography we often find in the names of the old authors. Thus, we have *cataracta, cataractes, catharacta, catarracta, catarractes, catarrhactes*, &c. The orthography of the word will be evident if we regard its etymology. It is from κατα, and ῥηγνυμι, whence καταῤῥακτης, "a robber or despoiler;" the latinization of which is *catarrhactes*,—the *h* being derived from the rough aspirate over the second ῥ. Brünnich's spelling of the word might perhaps lead us to suppose it derived from καθαιρω, "to cleanse or purify;" but this is evidently not the case,—the latinization of the word formed from the latter root giving us *cathartes*, Illiger's genus of American vultures.

This species is very closely related to the preceding, if it be really distinct from it. The fine series in the Museum of the Smithsonian Institution, procured by the United States Exploring Expedition under Com. Wilkes, all differ from the *skua* of Europe and America in the possession of shorter, and comparatively stouter and deeper bills, with more obtuse tips. These are the only points of discrepancy I have been able to detect in the examination of the series; but they appear to be quite constant.

Among the series is a specimen much larger than the rest, and than the *skua* from Europe. The bill is nearly two and a third inches long, and very stout; the wings an inch, and the tarsus a third of an inch longer than the average of European skins. It is evidently a very old individual, and the chestnut and whitish have almost entirely disappeared from both the upper and under parts, leaving the whole bird deep blackish-brown above, and a somewhat lighter brown, or fuliginous, below. The specimen is referred to in Cassin's List of the Birds of the Exploring Expedition, as "*Lestris* ——?" Although the general appearance of the bird is really different from that of the rest of the series, I do not think that the differences presented are anything more than indicative of the great age of the specimen. A collection of American and European Jägers, obligingly furnished by Mr. D. G. Elliott for examination, contains a specimen of the true *skua* from the Atlantic Ocean, which presents a very similar condition of things. The size is greater than that of any other of the series of specimens, and the colors are nearly as uniform as in the antarctic specimen referred to. I think it more than probable that the birds of this genus continue to grow in size and proportions with increasing age, and that the colors have a tendency to become darker and more uniform under the same circumstances.

Genus STERCORARIUS Brisson.

Stercorarius, Brisson, Ornithologia, 1760, vi. (Typus *Larus parasiticus*, Linn.) et auctorum pleriq.
Catharacta (partim), Brünnich, Ornith. Borealis, 1764.
Larus (partim), Linnæus, Systema Naturæ, 1766. Gmelin, Systema Naturæ, 1788. Latham, Index Ornithologicus, 1790. Meyer et Wolf, Taschenb. Deutsch, 1810.
Lestris, Illiger, Prodromus, 1811, p. 272. (Typus *Larus parasiticus*, Linn.) Et auctorum.
Prædatrix, Vieillot, Analyse, 1816, p. 62.
Labbus, Rafinesque, 1816, fide Bp.
Coprotheres, Reichenbach, 1850.

A single genus cannot, without great latitude and looseness of definition, be made to include all the species of this subfamily. The differences between *Buphagus skua* (with its southern representative *antarcticus*) and the other known species, are very great, and strongly pronounced, if we regard stature, proportions, character of central tail feathers, changes of plumage, &c. The differences fully warrant the distribution of the species of the subfamily into two genera, which may be thus defined:

Buphagus.—Bill shorter than the middle toe without the claw; exceedingly robust; width at base about equal to the height, which is a third of the length of culmen. Striæ and sulci numerous and well marked. Encroachment of feathers on bill moderate; and nearly the same on both mandibles. Occiput scarcely crested. Wings only moderately long for this subfamily,—the primaries very broad, and rounded at their tips. Tail very short, broad, nearly even, the feathers truncated; central pair projecting but little, and broad to their very tips, which are also truncated. Feet large and stout; tarsi shorter than the middle toe and claw. Size large; form robust and heavy; general organization very powerful. Colors much the same over the whole body;

not subject to any great variations with age, sex, or season. Species, *B. skua* (type) and *B. antarcticus*.

STERCORARIUS.—Bill equal to middle toe without the claw, moderately robust, height at base more than a third of culmen; striæ and sulci fewer and more slightly marked. Encroachment of feathers on bill very great, especially on the upper mandible, where it greatly exceeds that on the lower, and is of a different outline from that of *Buphagus*. Occiput decidedly subcrested. Wings exceedingly long, the primaries narrow, tapering, with quite acute tips. Tail long; the lateral feathers more or less graduated; the central pair considerably, sometimes excessively, elongated, tapering and filamentous. Feet rather slender, the tarsi equal to, or slightly longer than the middle toe and claw. Size moderate or small. Form less robust, general organization much less powerful. Nearly bicolor when adult; passing through very various states of plumage before arriving at maturity. Species, *S. pomarinus*, *parasiticus*, (type) *Richardsoni*, *Hardyi*, *spinicauda*, *Buffoni*.

Of these, the five last are very strictly congeneric in every particular. *Pomarinus*, by its larger size, somewhat more powerful form, shorter and broader central tail feathers, &c., shows a slight aberration towards *Buphagus*. But in all other features the essential characters of *Stercorarius* are so strongly pronounced, that it cannot afford a link by which the two genera may be united.

? STERCORARIUS POMARINUS Vieill. ex Temm.

Larus parasiticus, Meyer et Wolf, Tasch. Deutsch. ii. 1810, 490. (Sed non Linn. nec auct.)

Larus crepidatus, Gmelin, Systema Naturæ, i. 1788, 602. Latham, Index Ornithologicus, 1790, ii. 819. (Citat *Sterc. striatum*, Briss.)

Stercorarius striatus, Brisson, Ornith. vi. 1760, 152, pl. 13, fig. 2. (Juvenis.)

Lestris striatus, Eyton, British Birds, 18—, 53.

Lestris pomarinus, Temminck, Man. Orn. ii. 1820, 793. Temminck, Man. Orn. iv. 1840, 495. Faber, Prodromus Island. Ornith. 1822, 104. Brehm, Naturg. Europ. Vögel, 1823, 741. Bonaparte, Synopsis, 1826, No. 305. Lesson, Manuel Ornith. 1828, ii.388. Kaup, Sk. Ent. Europ. Theirw. 1829, 64. Swainson et Richardson, F. B. A. 1831, ii. 429. Nuttall, Manual Ornith. ii. 1834, 315. Audubon, Ornith. Biograph. 1839, iii. p. 396. Audubon, Synopsis, 1839, 332. Audubon, Birds America, 1844, vii. 186, pl. 451. Keyserling et Blasius, Wirbelth. Europ. 1840, i. 240. Schinz, Europ. Fauna, 1840, i. 388. Schlegel, Rev. Crit. Ois. Europ. 1844, 84. Bonaparte, Cat. Met. Ucc. Eur. 1842, 80. Bonaparte, Rev. Crit. Degland's Orn. Eur. 1850, 202. Thompson, Nat. Hist. Ireland, iii. 1851, 392. Bonaparte, Conspectus Avium, ii. 1856. 207. Des Murs, Traité d'Oologie Ornith. 1860, 551.

Stercorarius pomarinus, Vieillot, Nouv. Dict. d'H. N. xxxii. 1819, 158. Vieillot, Fauna Franç. 1828, 387. Selys-longchamps, Fauna Belg. 1842, 155. Degland, Ornith. Europ. 1849, ii. 291. Gray, Genera Birds, 1849, iii. 652. Lawrence, General Report Birds N. A. 1858, 838. Coues, Proc. Acad. Nat. Sc., Philada., 1861, p. 243.

Cataractes pomarinus, Stephens, Shaw's Gen. Zool. 1825, xiii. 216, pl. 24. Macgillivray, Man. Brit. Orn., ii. 1842, 256.

Coprotheres pomarinus, Reichenbach, Syst. Av. 1850, 52, pl. 328–9.

Catarractes parasita, var. *camtschatica*, Pallas, Zoograph. Rosso-Asiæ, 1811, ii. 312.

Habitat.—Seas and sea coasts of Europe, Asia and North America. Interior of Arctic America.

I will notice the stages of plumage of this species, from that of the fully adult to that of the young of the year. Having a very extensive series at command, I have endeavored to *trace* one stage from another, and point out

exactly how the great changes of plumage to which the bird is subject, are produced.

Adult.—Bill horn, deepening into black; feet black. Pileum and occipital crest brownish-black; this color extending much below the eyes, and occupying the feathers on the ramus of the inferior maxilla. Acuminate feathers of the neck light yellow. Back, wings, tail, upper wing coverts, under tail coverts as far as the flanks, deep blackish-brown. Under parts, from chin to abdomen, and neck all round, (except the yellow acuminate feathers,) *pure white*.

The above is the plumage of the fully adult bird, and is comparatively not often met with. A more usual state of plumage (described by Lawrence and figured by Audubon* as "fully adult,") is as follows:

Nearly adult.—Generally as in the preceding, but with a row of brown spots across the breast; the sides under the wings transversely barred with white and brown; the purity of the dark color of the abdomen interrupted by some touches of white. The legs still wholly black, and the tail feathers projecting as much as in the fully adult.

Now, as a somewhat younger stage than the preceding, we have the following

Intermediate stage, (No. 1275.)—The band of dark spots across the breast has widened and enlarged, so that the whole breast appears brown, mottled with white; the sides under the wings are conspicuously barred with white and brown; the white of the under parts is continued down over the abdomen to the under tail coverts; the pure brown of these parts which obtains in the adult, now only appearing as transverse bars among the white. The upper tail coverts and some of the wing coverts are barred with white. The bases of the primaries are inferiorly white. The central tail feathers now only project an inch. The tarsi are quite changed in color; they are now irregularly blotched with chrome yellow,—the hind toe and nail being of this color.

The above changes are very gradual, and readily identifiable; the *quo modo* of their production may be thus summed up: In the adult the white and brown occupy distinct and well-marked regions; and the two colors are separated by trenchant lines of division. The younger the bird, the more this distinctness of definition of colors is lost,—the white invading and barring the brown, and the brown invading and mottling the white, wherever the two join. Then also the feet lose their black, and are variegated with yellow.

Besides the above, we find a state characterizable thus:

Dusky stage.—The bird is very nearly *unicolor:* blackish-brown all over; this color deepening into quite black on the pileum; lightening into fuliginous brown on the abdomen, with a slight gilding of the black on the sides of the neck. The whitish bases of the primaries exist. The feet are in the chromo-variegated condition. The central tail feathers scarcely project half an inch.

In the last edition of the Manuel d'Ornithologie, Temminck corrects various errors committed in previous editions, and gives, as his mature opinion, four "varieties" of this species. By examining his diagnoses, it will be seen at a glance that his "variety C" is the fully adult plumage above characterized; of which he says truly that it is "assez rare." His "B" is our second stage; his "A" is about our third stage; while his "D" is the fusco-unicolor stage just given. In his earlier editions he maintains that this dusky stage is absolutely independent of sex; but latterly he says that it is possible that the dusky birds are females; the white-bellied ones males. Ornithologists maintain very diverse views on this subject; but I believe it is generally supposed that this state of plumage is not indicative of either sex, but simply of immaturity.

Now I think that the four plumages which Temminck describes as adults

* I have Audubon's original specimen before me. It agrees minutely with his plate; and is also the specimen from which Lawrence's description in the General Report was taken.

(varieties A, &c.) are really the progressive stages of the same individuals. I do not think that even the dusky stage constitutes a distinct "variety," (*i.e.*, the birds remaining in that state all through their lives;) much less the other stages. I am of opinion that every Jäger, before arriving at full maturity, passes through each of these states: beginning with a rufo-rayed plumage—to be presently described—passing from that next into the dusky; and then assuming successively the other stages above characterized. The only question is this: What age, sex, or season is this dusky stage characteristic of? I think that it comes in next after the very young rufo-rayed plumage, for this reason. We find these dusky birds to be generally less robust than the others; with weaker bills, less elongated central tail feathers, and parti-colored tarsi. Now it is well known, that the younger the bird, the smaller it is, the shorter are the central tail feathers, and the more yellow the tarsi. Another argument, by analogy, is that the *S. parasiticus* is found in exactly the same unicolor state; and from a great number of species it can be proved, I think, that in that species it supervenes directly from the rufo-rayed plumage. [See remarks under *L. parasitica.*]

The following is the plumage of birds of the year:

Young of Year.—Bill much smaller and weaker than in the adult, light colored to beyond the nostrils, when it becomes brownish-black. Feet and toes mostly bright yellow, the terminal portions of the latter black. The whole body is everywhere transversely waved with dull rufous. On the head, neck and under parts this rufous forms the predominating color; and the bands are exceedingly numerous, of about the same width as the intervening dark color. On the flanks and under tail coverts the bars become wider, and almost white in color. On the back and wing coverts the brownish black is the predominating color; and if any rufous is present, it is merely as a narrow edging to the feathers. The under wing coverts have irregularly-angular transverse waves of brownish black and white. The remiges and rectrices are brownish black, darker at their tips; fading into whitish towards the bases of their inner vanes. On the head and neck the light rufous decidedly predominates, and seems indistinctly but thickly nebulated with dusky; this dusky forming a conspicuous spot just at the anterior canthus of the eye. (In this plumage the bird is the *Stercorarius striatus* of Brisson and the *Larus crepidatus* of Gmelin and Latham.)

There can be no doubt that the *Stercorarius striatus* of Brisson, and the *Larus crepidatus* of Gmelin and Latham, refer to this species in the very immature state of plumage just described; when the bird is considerably smaller than when adult, and is wholly rayed with rufous and dusky, with white spaces at the bases of the wing and tail feathers. The *Stercorarius crepidatus* of Vieillot, (1817,) however, is the true *parasitica*, as is also the *Lestris crepidata*, of Degland, 1838, and of Schinz, 1840. The *Lestris crepidata* of Brehm (1823) is the young of the *Buffoni*. (Vide synonyms of these species.)

Latham in his Index, page 819, gives a "*Larus crepidatus* var. *β*," which is of course also to be referred to the young *pomarinus*.

The *Larus parasiticus* of Meyer and Wolf is, I believe, the only instance of the application of that specific name to this species. The other synonyms of the species do not require any special notice, as they are quite plain and uncomplicated.

By most authors the *Catharacta cepphus* of Brünnich is considered as referring to the long-tailed species. I must confess, however, that I can hardly discover grounds for such an identification of this name; and am rather inclined to the opinion that his *cepphus* is based upon the young *pomarinus;* as are the *crepidata* of Gmelin and Latham, and the *striatus* of Brisson. Let us look at the description for a moment. It is evident, from almost every paragraph of it, that he had in view a young bird of the year,—in the state

when they are transversely rayed with dusky and rufous,—paler on the abdomen, and have the bases of the quills and rectrices white. The only point is to determine of what species it is the young. Regarding its size, Brünnich compares it with his *Catharacta skua*, saying, that it is much smaller than that species, and "Magnitudo *parasiticæ*." The young of the year of *pomarinus* is more nearly of the size of an adult of *parasitica*, than is the young of the year of the long-tailed species. The description of the colors, form, &c., which follows, agrees precisely with those of the young *pomarinus;* and when we remember that at that date the differences between the common and long-tailed Jägers were not recognized, the two species being confounded together by authors generally, (except Brisson;) it does not appear by any means certain that Brünnich had the long-tailed species in view in drawing up the description of "*cepphus*." Had that been the case, he would probably have compared it with *parasitica* rather than with *skua*. Moreover, Latham, in his description of his *Larus crepidatus*, which is the young *pomarinus*, gives "*cepphus*, Brünn." as a synonym of that species.

Upon the whole, therefore, while I by no means insist upon the reference of the name under consideration to the *pomarinus*, I merely wish to show that it very possibly belongs to it: and that the description is too vague and uncertain to justify the use of the name for either of the species. It is for this reason that I have adopted Boie's name "*Buffoni*" for the long-tailed Jäger.

Having always professed a rigid adherence to the great law of priority in questions of nomenclature, I am, perhaps, in the present instance, rendering myself liable to be taken to task for not employing the name "*crepidatus*" of Gmelin and Latham (1788–90) for this species instead of *pomarinus* of Temminck, since the former name is in all probability based upon this species. The description is, however, short and unsatisfactory, and is, moreover, based upon the young bird of the year; and, though there cannot really be much doubt as to the species which these authors had in their minds in preparing their descriptions, still I think in view of the above considerations, that it will hardly be expedient to supersede so definite, long-known and universally employed a name as *pomarinus*. At the same time, should any one else see fit to do so, I would in future writings unhesitatingly follow his example.

4. Stercorarius parasiticus Gray ex Brünn.

?Sterna rectricibus duabus internis longissimis, Linn., Fn. Suec., No. 129.
?Larus rectricibus duabus internis longissimis, Linn., S. N., 1748.
Catharacta parasitica, Brünnich, Ornith. Borealis, 1764, 37.
Larus parasiticus, Linnæus, Syst. Nat., 1766, i. 226. Gmelin, Syst. Nat., 1788, i. 601. (Num Lath.? qui me judice potius ad longicaudatum Briss spectat.)
Cataracta parasitica, Retzius,* Fauna Suecica, 1800, 160.
Catarractes parasita, Pallas, Zoog. Rosso-Asiæ, ii. 1811, 310.
Lestris parasita, Keyserling et Blasius, Wirbelth. Europ., 1840, i. 240. Schlegel, Rev. Crit. Ois. Eur., 1844, 85. Bonaparte, Cat. Met. Ucc. Europ., 1842, 80. Des Murs, Traité d'Oologie Ornith., 1860, 551. Bonaparte, Rev. Crit. Degland's Orn. Eur., 1850, 202.

* It is difficult, perhaps impossible, to say whether the citations of the authors before 1800 really refer to this species, or to the long-tailed Jäger. I have, however, placed them under the head of *parasitica*, for this reason: Retzius in his edition of the Fauna Suecica (of 1800) gives them as synonyms of his *parasitica*, of which his description is, "*Rectrices* 6, 6, (i.e., the central pair) cæteris 4 poll. longiores;" thus clearly referring to the true *parasitica*. Descriptions of previous authors had mostly been merely "*Rectricibus mediis longissimis*," whence the uncertainty. Retzius, however, is in error in adducing *Stercorarius longicaudatus*, Briss., as a synonym of *parasitica*.

Lestris parasitica, Illiger, Prodromus, 1811, 273. Temminck,* Man. Ornith., 1820, ii. 796, (duæ species confusæ sunt.) Faber, Prodromus Island. Orn., 1822, 105, (Nonne duæ species confusæ ?) Brehm, Naturg. Europ. Vög., 1823, 744. Kaup, Sk. Ent. Eur. Thierw., 1829, 47. Lesson, Traité d'Ornith., 1831. 616. Schinz, Europ. Fauna, 1840, i. 390. Bonaparte, Conspectus Avium., 1856, ii. 208.

Lestris Richardsonii, ("Swains.") Temminck, Man. Orn., iv. 1840, 499. (Sed non Swains. quæ potius species distincta.) Nuttall, Man. Ornith., ii. 1834, 319. Audubon, Ornith. Biograph., iii. p. 503; Audubon, Synopsis, 1839, 332. Audubon, Birds America, 1844, vii. 190, pl. 452. Giraud, Birds L. I., 1844, 367. Schinz, Europ. Fauna, 1840, i. 392. Thompson, Nat. Hist. Ireland, 1851, iii. 394.

Cataractes Richardsoni, Macgillivray, Man. Orn., ii. 1842, 257.

Catharacta coprotheres, Brünnich, Orn. Borealis, 1764, 38, No. 138. In ætate fusco-unicolore.)

Lestris coprotheres, Des Murs, Traité d'Oologie Ornith., 1860, 551.

Lestris parasitica var. *coprotheres*, Bonaparte, Consp. Av., 1856, ii. 209.

Stercorarius ———, Brisson, Ornith., vi. 1760, (nomen specificum nullum.)

Stercorarius crepidatus, Vieillot, Nouv. Dict. d'H. N., xxxii. 1819, 155. (Sed non *Larus crepidatus*, Gmel., Lath., qui potius juvenis *Lestris pomarinus*, Temm.)

Stercorarius cepphus, ("Leach,") Swains. et Richardson, F. B. A., ii. 1831, p. 432. Stephens, Shaw's Gen. Zool., 1825, xiii. 211, pl. 23. Degland, Ornith. Europ., 1849, ii. 295, (nec auct.)

Stercorarius parasiticus, Selys-Longchamps, Fauna Belg., 1842, 155. Gray, Genera Birds, iii. 1849, 652. Lawrence, Gen. Rep. Birds N. A., 1858, 839. Coues, Proc. Acad. Nat. Sci. Philada., 1861, p. 243.

Lestris crepidata, Degland, "Mem. Soc. Roy. de Lille, 1838, 108." Juvenis. Schinz, Europ. Fauna, 1840, i. 390. Juvenis.

Habitat.—Coast of America and Europe, more particularly in higher latitudes. Interior of Arctic America.

Pursuing the question of the general "theory of variation" in this genus, it may be well to examine closely the various stages of this its typical species. The exceedingly rich series in the Smithsonian collection enables me to trace it through all its variations.

Young of the Year in August.—Size considerably less than that of the adult, form every way more delicate. Wings more than an inch shorter; bill and feet much slenderer and weaker. Bill in some specimens light bluish horn, in others greenish olive, the terminal portion brownish black. Tarsi and greater part of the toes yellow. The bird is every where rayed and barred with rufous and brownish black. On the head and neck the rufous is of a very light ochraceous tinge, and is by far the predominating color; the dark only appearing as a delicate line along the shaft of each feather. There is an aggregation of the brown into a spot at the anterior canthus of the eye. Proceeding down the neck to the back, the longitudinal lines become larger, and gradually spread wider and wider, until between the shoulders they occupy the whole of each feather, except a narrow border of rufous; which latter is of a deeper tint than on the head. Passing down the throat to the breast, the rufous becomes decidedly lighter,—almost whitish,—while the brown, which on the throat exists only as a light longitudinal line, changes on each feather to transverse bars of about equal width with the light rufous bars with which it alternates. This pattern prevails over the whole under

* This is a combination of *parasitica* and *Buffoni*, as shown by the description and indiscriminate citation of synonyms. This error Temminck corrects in his edition of 1840, (pp. 493, 499, 500,) where he recognizes the two species and describes them accurately: but unfortunately calls the *parasitica*, "*Richardsoni*," and the *Buffoni*, "*parasitica*."

parts,—the transverse bands being broadest on the flanks and under tail and wing coverts, narrowest in the middle of the belly. The primaries are brownish black, narrowly tipped with rufous, their shafts yellowish, their inner webs fading basally into white. The tail has the same coloration as the wings. The central feathers project about three-fourths of an inch.

As the bird above described grows older, the bill and feet become stouter, the cere better developed; while the rufous everywhere gives way to the darker color. No special stage can be characterized, however, until the rufous is far outweighed by the dusky. Then we have—

(No. 18652).—Size and general proportions nearly those of the adult. Bill and cere perfectly formed; feet mostly black, but with some yellow blotches. The upper parts are unadulterated with any rufous bars; the deep brownish-black pileum has appeared, and the sides of the neck have obtained their yellow nuance, which contrasts conspicuously with the fuliginous background. Evidences of immaturity, however, are found on the under parts, where the dark color is mixed with illy-defined transverse bars of ochraceous. Rufous is also found at the bend of the wing, and on the under wing and tail coverts. The primaries are still whitish baso-externally, as are also the rectrices. The central rectrices project $2\frac{1}{2}$ inches, and have the tapering form of those of the adults.

By the disappearance of the little rufous mentioned above, we have arrived at a very marked and decided stage,—viz:

(No. 20362).—With the size and proportions of the adult. Wholly deep dusky; darker and more plumbeous superiorly; lighter, and with a fuliginous tinge inferiorly; the pileum quite black; the latero-nuchal yellow, well pronounced; the remiges and rectrices quite black; feet black.

Having reached this perfect dusky stage, we will go back again to the young plumage first characterized, and show how specimens occasionally seem to proceed at once towards the adult condition with the white under parts. For example—

(No. 2754).—The juvenility of the specimen is attested by its small size, delicate bill and feet, little projection of the central rectrices, general mollipilose condition of plumage, &c. The rufous of the very young bird, instead of giving way everywhere to dusky, yields to this color only on the upper parts and crown; on the sides of the head, neck, and the whole under parts, whitish being the predominating color.—the continuity of this last being interrupted by indistinctly marked dusky bars. The yellow of the sides of the neck has not yet appeared. There is the same white space on the bases of the wings and tail as exists on the very young. The central tail feathers only project about $1\frac{1}{2}$ inches.

By an attentive consideration of the preceding facts, it will be evident that we have found the same very young plumage to change gradually through one series of specimens into the fusco-unicolor state; through another series into a stage which tends to pass directly into the normal plumage of the fully adult bird, without going through this dusky epoch. What can we deduce from this perplexing fact? Does one *sex* assume this dusky plumage at a certain age, and the other not? Does this dusky state constitute the normal adult plumage of one sex? Is it a *seasonal* feature, which both sexes return to at certain periods in each year?—or, finally, does it constitute a purely accidental, but constant *variety?* Authors of weight are divided on each of these points.

I reject entirely the last hypothesis,—viz: that some birds attain to this dusky stage and retain it during their lives, though they may have sprung from normally colored parents, and have normally colored progeny. Whatever age or season, or whichever sex this state of plumage indicates, I think there can be no reasonable doubt that it is a normal and constant stage which every individual of one (or both?) sexes passes through or attains to, in its

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progress towards maturity. The only question is, what age is to be assigned to this dusky state, and whether one or both sexes participate in it.

Leaving now speculation for facts, we have yet to notice the mature bird. Taking either the dusky state (No. 20362,) or No. 2754, we find that both tend to produce the following plumage:

Nearly mature, (No. 20144.)—Size and form of the adult. Pileum and latero-nuchal region, and whole upper parts, as in the adult. The under parts white (as in the adult), but clouded everywhere with dusky patches, most marked across the breast, on the sides, the flanks, and under tail coverts, and leaving the middle of the belly and throat nearly pure. Varying degrees of this dusky nubilation approach in some specimens nearly to the uniform dusky above characterized; in others fade almost into the pure white of the adult, —connecting the two ages perfectly and uninterruptedly. The tarsi of those specimens most dusky have small yellow blotches; the others not.

Now, by the complete obliteration of these dusky cloudings on the throat, breast and belly, and its increased intensity on the under tail coverts and abdomen as far as the flanks, we arrive at last at the

Adult, perfect plumage, (No. 16802).—Bill a little shorter than the head or tarsus, about equal to middle toe without the claw; stout, about as high as broad at the base. Cere longer than the nail. Culmen broad and flattened, with a longitudinal groove on each side. Nostrils as in the other species. Curvature of culmen and tomia very gradual. Gouys short, about straight; rami very long, a little concave; eminentia symphysis little marked. Striæ and sulci as in the other species. Tarsi about as long as the middle toe and claw, moderately stout, somewhat roughened supero-posteriorly, but not nearly as much so as in *pomarinus*. Scutellation and reticulation of tarsi, toes, and interdigital membranes as in the other species. Tail moderately long, slightly graduated, the lateral feathers broad quite to their apices, which are somewhat truncated, the shaft slightly protruding as a small mucro; the central pair projecting three to four inches; rigid; not losing much of their breadth until about four inches from their ends, when they commence to converge regularly to a quite acute apex. They have nothing of the filamentous character of those of *Buffoni*. Wings long, powerful, their rhachides rigid, their apices somewhat acute. Pileum, occipital crest, whole upper parts, deep brownish black, with a somewhat slaty tinge, and a slight but appreciable metallic nuance; this color deepening into quite black on the wings and tail. Rhachides of primaries and rectrices whitish, except at their tips; the inner vanes albescent baso-internally. Chin, throat, sides of head, neck all round and under parts to the vent, pure white; the feathers of the latero-nuchal region rigid, acuminate, with disconnected fibrillæ, light yellow. Under tail coverts like the upper parts, but somewhat of a fuliginous tint; the line of demarcation from the white of the abdomen very trenchant.

Dimensions of fully adult.—Bill above 1·40 inches; height or width at base, about ·50. Wing, from flexure, 13·00: tarsus, or middle toe and claw, 1·80; tail 5½, its centre feathers nearly 9·00.

Dimensions of young of year.—Bill above 1·30; height or width at base ·40; wing 12·00; tarsi, or middle toe and claw, 1·70; tail 5·00; central tail feathers not quite 6·00.

Stercorarius Richardsoni Coues ex Swainson.

Lestris Richardsoni, Swainson, Fauna Boreali-America, 1831, ii. p. 433, pl. lxxiii. sed non auctorum.

Habitat.—Interior of Arctic America.

Diag.—S. *Stercorario parasitico* similis; sed major, rostro, tarsis, alisque longioribus; caudâ magis productâ et rotundatâ, rectricibus latioribus.

This species is treated of at length in the beginning of the present paper.

6. Stercorarius Hardyi Coues ex Bonap.

Lestris Hardyi, Bonaparte, Comptes Rendus Acad. Sciences, 1856, p. 20. Tab. Longip. species 5. Bonaparte, Conspectus Avium., ii. 1856, 210.

Diag.—"Similis *Lestrido parasiticæ;* sed minor, et rostro magis compresso; rectricibus elongatis mediis apice rotundatis."—(Bp.)

Habitat.—Southern oceans, between Philippine and Sandwich islands.

I am only acquainted with this species through the notices of Bonaparte, above cited. The diagnosis is copied from the Conspectus Avium. The species is evidently very closely related to the *parasitica*, if it be really distinct from it.

7. Stercorarius spinicauda Coues ex Hardy.

Lestris spinicauda, "Hardy." Bonaparte, Comptes Rendus Ac. Sciences, 1855. Bonaparte, Conspectus Avium, 1856, ii. 210.

Diag.—"Similis *L. Hardyi* et *parasitico;* sed etiam minor *Lestrido ceppho;* cauda truncata; rectricibus mediis lineari-acutis, rachide denudata, rigida, pollice et ultra cæteras superantibus; rostro brevi, robusto."—(Bp.)

Habitat.—Coast of Africa, near St. Helena.

A species with which, like the *S. Hardyi*, I am autoptically unacquainted. If, however, the above characters really obtain, they would seem abundantly sufficient to distinguish it. The diagnosis is copied from Bonaparte.

8. Stercorarius Buffoni Coues ex Boie.

Stercorarius longicaudatus, Brisson, Ornith., 1760, vi. 155. Vieillot, Nouv. Dict. d'H. N. 1819, xxxii. 157. Degland, Ornith. Europ., 1849, ii. 298. Selys-Longchamps, Fauna Belg., 1842, 156.

Lestris longicaudatus, Thompson, N. H. Ireland, iii. 1851, 399.

Cataractes longecauda, Macgillivray, Man. Orn., ii. 1842, 258.

??Catharacta cepphus, Brünnich, Orn. Bor., 1764, 36.

Cataractes parasitica, Macgillivray, Brit. Birds, v.

Lestris cephus, Keyserling et Blasius, Wirbelth. Europ., i. 1840, 240. Bonaparte, Cat. Met. Ucc. Eur., 1842, 80. Bonaparte, Rev. Crit. Degland's Orn. Eur., 1850, 202. Bonaparte, Conspectus Avium., 1856, ii. 209. Des Murs, Traité d'Oologie Ornith., 1860, 551.

Stercorarius cepphus, Gray, Genera Birds, iii. 1849, 652. Lawrence, Gen. Rep. Birds N. A., 1858, 840. Coues, Proceed. Acad. Nat. Sci. Philada., 1861, p. 243.

?Larus parasiticus, Latham, Index Ornithologicus, ii. 1790, 819.

Lestris parasitica, Temminck, Man. Orn., iv. 1840, 501. (Sed non *Larus parasiticus*, Linn., Gmel. et auct.) Lesson, Man. Orn., 1828, ii. 388. Swainson and Richardson, F. B. A. 1831, ii. 430. Nuttall, Man. Orn., 1834, ii. Audubon, Orn. Biog., 1839, iii. 470. Audubon, Synopsis, 1839, 333. Audubon, Birds Amer., 1844, vii. 192, pl. 452. Giraud, Birds Long Island, 1844, 364.

Lestris Buffoni, "Boie, in Meyers' Taschenb., 1810, iii. 212." Boie, Isis, 1822, 562 et 576. Bonaparte, Synop. Birds N. A. 1826, No. 306. Lesson, Traité d'Ornith., 1831, 616. Kaup, Sk. Ent. Eur. Thierw., 1829, 47. Schinz, Europ. Fauna, 1840, i. 391. Schlegel, Rev. Crit. Ois. Eur., 1844, 85.

Lestris Lessoni, Degland, "Mem. Acad. Roy. de Lille, 1838." Juvenis. Schinz, Europ. Fauna, 1840, i. 392. Juvenis.

Lestris crepidata, Brehm, Naturg. Eur. Vög., 1823, 747. Nec Gm., nec Lath., nec Vieillot.

Adult, breeding plumage.—Bill dusky, its nail almost black. Tarsi deep leaden blue; tibiæ, phalanges, interdigital membranes and claws black. Occiput subcrested, more decidedly than in any other species, forming a calotte of brownish black; which color extends downwards on the cheeks,

the feathers before and below the eye, and on the sides of the bill, being of this color. Neck all round, but especially the sides of the head and the peculiarly formed feathers on the latero-nuchal regiou, light straw yellow. Whole upper parts, with upper wing and tail coverts deep slate; which, on the primaries, secondarics, lateral tail feathers and distal half of central pair, deepens into a pure lustrous brownish black. Under surface of wings and tail deeper slate than the back, but not so deep as the upper surfaces. Chin, throat and upper breast white; gradually becoming obscured with dusky plumbeous, which deepens posteriorly, so that the abdomen and under tail coverts are nearly as dark as the back. Rhachides of first two or three primaries pure white, deepening into brownish black at their extreme apices; of the other primaries, and of the tail feathers (including the ceutral pair) brown, except just at the base, deepening iuto quite black terminally. The inferior surfaces of all the rhachides are white for uearly their whole length.

Length of culmen 1·15 inches; gape 1·70; cere ·60; unguis about the same; gonys ·30; from feathers on sides of bill to tip ·90; wing 12·50; tail 6·25; central pair 14·00 to 16·00; the projection 8·00 to 10·00 inches; tibiæ bare ·75; tarsus 1·60; middle toe without claw 1·40.

Habitat.—Sea coasts of America and Europe, particularly in the higher latitudes. Interior of Arctic America.—(Kennicott.)

The changes of plumage of this species are strictly homologous with those of *S. parasiticus;* and it is therefore quite unnecessary to preseut them in this connexion.

As before remarked under head of *parasitica*, it is exceedingly difficult, if not quite impossible, to determine positively to what species the "*parasitica*" and "*cepphus*" of the older authors refer. This coufusion is occasioned partly by the brief and vague diagnoses given, and partly by the fact that the two species were really confounded by authors (except Brisson) until comparatively quite a late period. Even so late as 1820 Temminck does not separate the two: his description applies to either, and the synonyms of both are indiscriminately adduced. From which state of things it results that nearly all the older names and citations may be without difficulty referred to either species. This in effect has been really done; some authors, for example, considering Brünnich's or Liunæus' *parasitica* to be the long-tailed species, and others holding a coutrary opiuion, until the identification of these names has become almost a matter of choice, or rather of tacit agreement among ornithologists. This is the more to be regretted since on it depends the question whether the common or the long-tailed Jäger is to be called *parasiticus*. A glance at the synouymy of the species will show that authors have been about equally divided on these points. Before the introduction of "*Richardsoni*" by Swainson, the common Jäger was usually called "*parasitica;*" but after the adoption of this name "*Richardsoni*" by Temminck, for the common Jäger, the name *parasitica* was for some years almost universally applied to the loug-tailed species. In the year 1819, or thereabouts, the name of *Buffoni* was proposed by Boie for the long-tailed species, and was adopted by many writers; while others had recourse to Brisson's old name "*longicaudatus.*" Within the last few years, however, the name "*parasitica*" has again reverted to the common Jäger, while the other species has beeu usually called "*cepphus,*" after Brünnich. This ideutification of Brünnich's uame is adopted by Gray, Bonaparte, and other writers. Our reasons for rather referring it to the *Stercorarius pomarinus* will be found under the head of the latter.

Granting, as it is undoubtedly wisest to do, that the *parasitica* of Brünnich, Linnæus and Gmelin, is really the common short-tailed Jäger, it still remains an open question to which species we are to refer the *Larus parasiticus* of Latham. I incline to the opinion that it is based upon the long-tailed species, for the following reason: Although the diagnosis is brief and unsatis-

factory, and although the synonyms of the two species are indiscriminately adduced, (thus, *e. g.*, *Larus parasitica*, Linn. and *Catharacta parasitica*, Brünn., with *Stercorarius longicaudatus*, Briss., &c.,) yet in his further description he says of it, "21 pollices longus." The common Jäger never attains to this dimension.

Latham commits the error of giving *Stercorarius longicaudatus*, Briss., as the *male*, and *Stercorarius* ———, Briss., (without a specific name,) as the *female* of his species; whereas, these two citations really refer to the two distinct species.

The specific name "*longicaudata*" of Brisson (1760) being untenable for obvious reasons,—"*cepphus*" of Brünnich (1764) being too indefinite to warrant its employment,—"*parasitica*" of Brünnich (1764) being used for the common Jäger,—the first definite distinctive name for the long-tailed species appears to be "*Buffoni*" of Boie, (1819.) This specific appellation we accordingly adopt.

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Note.—The present paper completes a series of brief reviews of the three most important of the four subfamilies of the Laridæ,—viz.: the Larinæ, Sterninæ and Lestridinæ. In conducting an investigation into the characters and the bibliography of these groups, with special reference to North American forms, it has been thought expedient to issue in advance a brief prodromus, so to speak, of each subfamily as soon as its examination was completed. Combining the results arrived at in the investigation of each of these groups, and making whatever additions or modifications future research may dictate, the writer hopes before long to present a more complete and elaborate Monograph of the North American forms of the Laridæ. It is contemplated to present the anatomical as well as the external characters, both of the higher groups and of the more marked species; the changes of plumage, dependent upon either age, season, sex, or pure accident, which examination of very extensive series may show; together with the bibliography of each species, and a discussion of doubtful points of nomenclature and relationship. The Monograph will be illustrated by colored plates of the bills, wings, feet, &c. of most of the species, showing exactly wherein one differs from another; and no pains will be spared to render it a complete exposition of the present state of our knowledge of this family of birds.

Synopsis of the MARINE INVERTEBRATA collected by the late Arctic Expedition, under Dr. I. I. Hayes.

BY WM. STIMPSON, M. D.

The collections of Dr. Hayes, as might be expected from the thorough search to which the Arctic regions have lately been subjected, and the characteristic paucity of forms existing there, embrace few novelties. They possess, however, great interest, from having been found in great part at localities much nearer the Pole than any previous expeditions have succeeded in reaching on the American side of the Arctic circle. They include some species hitherto found only on the European side. And, we may add, the number of species collected by Dr. Hayes is greater than that brought back by any single expedition which has yet visited those seas, as far as can be judged by published accounts.

Of the localities mentioned below, *Port Foulke* and *Littleton I.* are on the eastern or Greenland shore of Smith's Straits, in lat. 78½°. *Cape Faraday* is on the west shore of the same Straits, in lat. 79° 45′. *Godhavn* is at the southern end of Disco Island, in lat. 69° nearly.

CRUSTACEA.

1. Eupagurus pubescens Brandt. *Pagurus pubescens* Kroyer, Naturhist. Tidsskrift, ii., 251; Voy. de la Recherche, Crust. pl. ii., f. 1. Godhavn.

2. Crangon boreas J. C. Fabr. *Cancer boreas* Phipps, Voy. towards the North Pole, 190, pl. xii., f. 1; 1773. *Cancer homaroides* O. Fabr., Fauna Groenlandica, p. 241. Godhavn; Port Foulke; Littleton I.

3. Hippolyte Gaimardii M. Edw., Hist. Nat. des Crust. ii., 378. Kroyer, Monografisk Fremstilling af Slaegten Hippolytés Nordiske Arter, p. 74, pl. i. f. 21–29. Port Foulke.

4. Hippolyte gibba Kroyer, Monog. 80, pl. i., f. 30, 31, et pl. ii. f. 32, 37. *H. Belcheri* Bell, in Belcher's Arctic Voyage, ii., 402, pl. xxiv. f. 1. Port Foulke.

5. Hippolyte turgida Kroyer, Monog. 100, pl. ii., f. 57, 58, et pl. iii., f. 59–63. Godhavn; Port Foulke.

6. Hippolyte Phippsii Kroyer, Monog. 106, pl. iii., f. 64–68. Port Foulke.

7. Hippolyte polaris Owen, Appendix to Ross' Voyage, p. 85. Kroyer, Monog. 116, pl. iii., f. 78–81, et pl. iv., f. 82. *Alpheus polaris* Sabine, App. to Parry's Voyage, p. 238; pl. ii., f. 5–7. Port Foulke; Littleton I.

8. Hippolyte borealis Owen, Appendix to Ross' Voyage, p. 84, pl. i., f. 3. Kroyer, Monog. pl. 122, pl. iii., f. 74–77. Littleton I.

9. Hippolyte aculeata M. Edw., Hist. Nat. des Crust., ii., 380. Kroyer, Monog., 126, pl. iv., f. 83–98, et pl. v., f. 99–104. *Cancer aculeatus* O. Fabr., Fauna Groenl. p. 239. *Alpheus aculeatus* Sabine, Appendix to Parry's Voyage, p. 237, pl. ii., f. 9. Godhavn.

10. Mysis oculata Kroyer, Groenlands Amfipoder, p. 88. *Cancer oculatus* O. Fabr., Fauna Groenl., p. 245. Port Foulke.

11. Anonyx ampulla Kroyer, Naturhistorisk Tidsskrift, Anden Raekke, i., 578. Voyage de la Recherche, pl. xiii., f. 2. *Cancer ampulla* Phipp's Voyage towards the North Pole, 1773, p. 191, pl. xii., f. 2. *Gammarus ampulla* Sabine. *Anonyx lagena* et *A. appendiculosus* Kroyer, Groenl. Amph., pl. 1. Dr. Hayes' specimens were obtained at "Gale Point," which I am unable to find on the chart. They differ somewhat from authentic specimens of the species, received from the Scandinavian Naturalists, in being larger, and in having the upper lobe of the eye broader.

12. Pherusa tricuspis nov. sp. Near *P. bicuspis* (*Amphitoe bicuspis* Kroyer, Groenland's Amfipoder, p. 45, pl. ii., f. 10) but has a dorsal spine, of lesser size, on the last thoracic segment, as well as on the first and second abdominal ones. The gnathopoda are slender and weak, the hands being no broader than the preceding joints. The antennæ are very slender and nearly as long as the body. The latero-posterior margin of the third abdominal segment is armed with two small teeth, one situated at the inferior angle, (which is a right angle,) the other at some little distance above and hook-shaped, the point curving upward. The upper pair of uropoda or caudal stylets is shorter than the other two pairs. Length nearly one inch. Littleton Island.

13 Gammarus locusta J. C. Fabr., Ent. Syst. ii., 516. Kroyer, Groenl. Amfip., 27. Bate and Westwood, Hist. of British sessile-eyed Crustacea, i. 378, wood-cut. *Cancer locusta* Linn. Fauna Suecica, 2d ed. 497. *Oniscus pulex* O. Fabr., Fauna Groenl. p. 254. *Gammarus pulex* Stimpson, Mar. Invert. of Grand Manan, p. 55. Port Foulke.

14. Themisto arctica Kroyer, Groenland's Amfipoder, p. 63, pl. iv. f. 16, (?) In stomach of seal taken at Cape Faraday.

15. Bopyrus hippolytes Kroyer, Groenl. Amfip. p. 78, pl. iv. f. 22. Voy. de la Recherche, pl. xxviii. f. 2. Port Foulke.

16. Apus glacialis Kroyer, Naturhistorisk Tidsskrift, 2 R. ii. 431. Fresh waters of Greenland.

17. Branchipus paludosus Müll. *Cancer stagnalis* O. Fabr., Fauna Groenl. p. 247. With the last.

18. Lernæopoda elongata Grant, Edinburg Journal of Science, 1827, No.12. Kroyer, Naturhist. Tidsskrift, i. p. 259. Steenstrup and Lütken, Danske Vid. Selsk. Skrifter, 5te Raekke, Nat. Math. Afd. 5te Bind, 1861, p. 422, pl. xv. f. 37. Port Foulke.

19. Hæmobaphes cyclopterina, Steenstrup & Lutken, Danske Vid. Selsk. Skrifter, etc., 5te Bind, 1861, p. 405, pl. xiii., f. 30. *Lernæa cyclopterina* O. Fabr., Fauna Groenl. p. 337. This very curious Lernæan, which has its ovigerous tubes arranged in two regular and closely-twisted spires, was found attached to the gills of a *Gymnelis viridis* taken at Littleton Island.

20. Balanus porcatus Costa. *Lepas balanus* O. Fabr., Fauna Groenl. p. 423. West coast of Greenland.

21. Balanus balanoides Darwin. *Lepas balanoides* O. Fabr., Fauna Groenl. p. 422. Port Foulke.

22. Coronula diadema Blainville, Dict. des Sc. Nat. 1824, tab. 117, f. 4. *Lepas diadema* Lin. *Lepas balænaris* O. Fabr., Fauna Groenl. p. 425. On Whales, Baffin's Bay.

ANNELIDA.

23. Lepidonote cirrata Oersted, Groenland's Annulata Dorsibranchiata, p. 14, figs. 1, 5, 6, 11, 14, 15. *Aphrodita cirrata* O. Fabr., Fauna Groenl. p. 308. Port Foulke.

24. Lepidonote punctata Oersted, l. c. p. 16. *Aphrodita punctata* O. Fabr., Fauna Groenl. p. 312. Port Foulke and Littleton Island.

25. Onuphis conchilega Sars, Beskr. og Jagttagelser, etc., p. 61. *O. Eschrichtii* Oersted, l. c. p. 20, f. 33–41, 45. Godhavn.

26. Nereis pelagica Lin., Oersted, l. c. p. 23, figs. 52, 53, 55, 58, 59. *N. verrucosa* O. Fabr. Godhavn.

27. Nephthys cæca Oersted, l. c., p. 41, figs. 73, etc. *Nereis cæca* O. Fabr. Godhavn.

28. Phyllodoce groenlandica Oersted, l. c., p. 40, figs. 19, 20, etc. Port Foulke.

29. Scoloplos quadricuspida Oersted, l. c., p. 48, figs. 106–110. *Nais quadricuspida* O. Fabr. Godhavn.

30. Cirratulus borealis Lam'k, Oersted, l. c., p. 54, figs. 98, 102. *Lumbricus cirratus* O. Fabr., Fauna Groenl. p. 281. Godhavn; Littleton I.

31. Ammotrypane limacina Rathke, Beitrage zur Fauna Norwegens, p. 202, pl. x. f. 4–8. Godhavn.

32. Siphonostomum plumosum Rathke. *Amphitrite plumosa* O. Fabr., Fauna Groenl. p. 288. An. Müller, Zool. Dan. Prodr. No. 2521 ? Port Foulke. Dr. Hayes' specimen has a much rougher surface than occurs in the Norwegian examples, if we may judge of the latter by Rathke's figures.

33. Tecturella flaccida Stimpson, Mar. Invert. of Gr. Manan, p. 32. *Siphonostomum vaginiferum* Rathke, Beiträge zur Fauna Norwegens, 211, pl. xi., f. 3–10 ? Port Foulke.

34. Brada inhabilis. *Siphonostomum inhabile* Rathke, Beiträge zur Fauna

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Norwegens, in Nov. Act. Acad. Cæs. Leop. Carol. Nat. Curiosorum, Vol. xx. p. 218, pl. xi., f. 13. Gale Point. We cannot be quite certain that the Greenland specimens, which are somewhat imperfect, are specifically identical with those of Norway. But they agree in size and all characters which can be clearly made out from the specimens received. Rathke's *Siphonostomum inhabile* evidently belongs to our genus *Brada*, Mar. Invert. of Gr. Manan, p. 32.

35. Terebella cincinnata Reinhardt. *Amphitrite cincinnata* O. Fabr., F. G., p. 286. Godhavn.

36. Terebella cirrata Cuv., Rathke, l. c., p. 230. *Amphitrite cirrata* Müll., O. Fabr., F. G. p. 285. Godhavn.

37. Pectinaria Eschrichtii Rathke, l. c., p. 219. *Amphitrite auricoma* Müll., O. Fabr., F. G., p. 289. *Pectinaria groenlandica* Grube, Familien der Anneliden, p. 82. Godhavn ; Port Foulke.

38. Spirorbis nautiloides Lam., An. s. vert., v. 613. *Serpula spirobis* Lin. O. Fabr., F. G., p. 337. Port Foulke.

39. Priapulus caudatus Lam. *Holothuria priapus* O. Fabr., F. G., p. 355. Port Foulke. Found in the stomach of a walrus.

40. Cosmocephala angulata. *Planaria angulata* Müll., O. Fabr., F. G., p. 323. Godhavn.

MOLLUSCA.

41. Clione limacina Phipps. *Clio retusa* Müll.; O. Fabr., F. G., p. 334. *Clio borealis* Brug. Port Foulke.

42. Buccinum scalariforme Beck, in Möller's Index Molluscorum Groenlandiæ, p. 11. Godhavn.

43. Buccinum cyaneum Beck, in Möller's Index Moll. Groenl. p. 11. Port Foulke.

44. Trophon clathratum Möller, Index Moll. Groenl., 14. *Murex clathratus* Lin. *Fusus bamffius* Gould, Inv. Mass., p. 289, f. 198. West coast of Greenland.

45. Trophon craticulatum Moerch. *Tritonium craticulatum* O. Fabr. *Trophon Fabricii* Beck. N. W. coast of Greenland.

46. Natica clausa Sow. N. W. coast of Greenland.

47. Margarita cinerea Conthouy, Gould, Inv. Mass., p. 252. N. W. coast of Greenland.

48. Margarita helicina Möller, Index Moll. Groenl., p. 3. *Turbo helicinus* O. Fabr., F. G., p. 393. *Margarita arctica* Gould, Inv. Mass., p. 255, f. 173. The specimens brought home by Dr. Hayes from the N. W. coast of Greenland are of a much larger size than those found on the coast of New England. One of them measured 0.57 inch in diameter.

49. Mya truncata Lin. Port Foulke, very abundant. Nearly all the specimens are of the short, broadly and obliquely truncated form, with the beak near the posterior end, called *Uddevallensis* by Forbes, which is characteristic of the glacial deposits of Europe and America, and is now found living, for the most part, only in high northern latitudes. The *siphons* of this bivalve were found in great numbers in the stomach of a walrus.

50. Saxicava arctica Desh. *Mya arctica* Lin., O. Fabr. *Mya byssifera* O. Fabr. *Saxicava rugosa* Lam. *Saxicava distorta* Gould non Say. Port Foulke, large and very abundant. Among Dr. Hayes' specimens, the form *arctica* appears in much greater numbers than that called *rugosa* or *pholadis*. The siphons of this species also were found in a walrus' stomach.

51. Macoma sabulosa Moerch, in Rink's Greenland, App. p. 90. *Tellina sabu-*

losa Spengler. *T. proxima* Brown. *Sanguinolaria sordida* Gould, Inv. Mass. p. 67. N. W. coast of Greenland.

52. Astarte elliptica Macgillivray, Moll. Aberd. 259. *Crassina elliptica* Brown, Illust. Conch. G. B., pl. xviii., f. 3. N. W. coast of Greenland.

53. Astarte plana J. Sow., Min. Conch. pl. clxvix., f. 2, 1817. *Venus borealis* Chemn. (non Lin.) *Crassina corrugata* Brown. *Astarte lactea* Brod. & Sow., Gray, App. to Beechey's Voy., Zool., 152, pl. xliv., f. 19. Port Foulke.

54. Astarte striata Gray, Beechey's Voy., Zool., p. 152, pl. xliv. f. 9. *Nicania striata* Leach. West coast of Greenland.

55. Cardium (Serripes) groenlandicum Chemn. West coast of Greenland.

56. Cardium Hayesii, nov. sp. Near *C. islandicum*. Shell rather thick, elevated; beaks prominent; ribs acute, 33 to 35. Within yellowish; teeth strong; ligamental fulcrum short, so that the little notch indicating its posterior extremity is situated about the middle of the distance between the cardinal and the posterior lateral teeth. Inner margin strongly crenated throughout, as well on the posterior margin as on the inferior and anterior ones.

In this short description we have given only the characters which distinguish the species from its nearest allies, all of which inhabit the same seas. *C. islandicum* has more numerous ribs, a thinner shell, less prominent beaks, and a weaker hinge. *C. arcticum* Sow. has less numerous ribs. *C. Dawsoni* is more oblique, with a much thinner shell and weaker teeth. *Cardium interruptum* of the English crag is less tumid, less oblique, and more pointed behind. *C. Hayesii* also differs from all these species in the shortness of the ligamental fulcrum.

Of this shell two specimens were taken by Dr. Hayes at Disco Island. One measures 0.88 inch in height by 0.9 inch in length; the other 1.6 x 1.75. With age it shows a tendency to become more compressed and expanded about the margins. I have received the same shell from Nova Scotia.

57. Leda minuta Möll. *Arca minuta*, Müll., O. Fabr., etc. West coast of Greenland.

58. Modiolaria lævigata Lovén. *Modiola lævigata* Gray, App. to Parry's 1st Voy., p. 244. *Mytilus discors* O. Fabr., non. L. West coast of Greenland.

59. Crenella faba. *Mytilus faba* O. Fabr., F. G., p. 419. *Modiola pectinula* Gould. N. W. coast of Greenland.

60. Mytilus edulis Lin. Godhavn.

61. Pecten islandicus Müll. West coast of Greenland.

ECHINODERMATA.

62. Pentacta frondosa. *Holothuria frondosa* Gunner. Godhavn.

63. Chiridota laeve Grube. *Holothuria lævis* O. Fabr. Godhavn.

64. Myriotrochus Rinkii, Steenstrup, Vidensk. Meddel. fra den Naturh. Forening, 1851, 55, tab. iii., f. 7–10. Port Foulke.

65. Asterias groenlandica. *Asteracanthion groenlandicus* Steenstrup. Port Foulke.

66. Asterias albula. *Asteracanthion albulus*. Stimpson *Asteracanthion problema* Steenstrup. Port Foulke, Godhavn.

67. Ophioglypha squamosa. *Ophiura squamosa* Lüt. Port Foulke, Godhavn.

68. Ophiopholis aculeata Lütken. *Ophiura aculeata* Müll. Godhavn.

ACALEPHÆ.

69. Lucernaria auricula O. Fabr., Fauna Groenl., p. 341. Godhavn.

Besides the above, Dr. Hayes brought home a considerable number of Nudibranchiata, Actiniæ, etc., which are very difficult to determine from alcoholic specimens.

[May,

Contributions towards a Monography of the order of PHOLADACEA, with Descriptions of new Species.—No. 2.

BY GEORGE W. TRYON, JR.

Additions to Bibliography.

Deshayes, G. P. Letter in Zeit. für Malak. p. 44, March, 1845.

Dufo, M. H. "Observations sur les mollusques marins, terrestres et fluviatiles des îles Sèchelles et des Amirantes." Ann. des Sc. Nat. p 221, 1840.

Fischer, P. Note sur l'animal du Jouannetia Cumingi, suive de la description de deux espèces nouvelles du même genre. Journ. de Conchyl. p. 371, Oct., 1862.

Jonas, J. H. Bemerkungen über einige der von Lamarck in seiner Hist. Natur. des Anim. s. Vertebr. aufgeführten Conchylien Arten, mit besonderer Rücksicht auf die Zusätze des Hernn, Deshayes. Zeit. für Malak. p. 135, Sept., 1844.

Conchyliologische Notizen. Zeit. für Malak. p. 182., Nov., 1845.

Stimpson, Wm. On the genus Diplothyra, Am. Jour. Science, p. 445, May, 1863.

Descriptions of Species.

ROCELLARIA DENTIFERA, Dufo.

Gastrochæna dentifera, Dufo. Ann. des Sc. Nat. p. 221, 1840.

Shell smooth and very thin, having an apophysis in the anterior part of each valve, and having also in each valve, but at the posterior extremity, a rounded and soldered piece.

Hab.—Madrepores, Seychelles and Admiral Islands. Very rare.

JOUANNETIA DUCHASSAINGI, Deshayes.

Jouannetia Duchassaingi, Deshayes, Fischer, Journ. Conchyl. p. 375, t. 15, f. 3, Oct., 1862.

"Testa globosa, solidissima, alba, valvis antice callo solido, longitudinaliter striato, munitis; area antica longitudinaliter costata, transversim dense striata; area postica subtile et oblique striata; appendiculo postico valvæ dextræ elongato, lato, rotundato, intus, lævi; impressionibus muscularibus latis, crassis, lamellas promimentes formantibus.

Diam. antér. post. 50 mill.
Alt. 41 "

Hab.—Panama. (Coll. Deshayes.)

Obs.—This fine species, which surpasses in its size the *Jouan. pectinata*, belongs to the group of *Jouan. Cuminigi;* its specific characters are entirely different, so that it is impossible to confound it with that species."

JOUANNETIA VIGNONI, Fischer.

Jouannetia Vignoni, Fischer, Journ. de Conchyl. p. 376, t. 15, f. 4, Oct., 1862.

"Testa rotundato-ovata globosa, solidiuscula, valvis antice callo inflato munitis; area antica radiatim costata, transversim et valide striata; area postica late sulcata (in valva dextra,) dense et transversim striata (in valva sinistra;) appendiculo valvæ dextræ elongato, rostrato, ad margines serrato; impressionibus muscularibus posticis planis.

Diam. antér. post. 10 millim.
Alt. 7 "

Hab.—West Coast of Africa. (Captain Vignon.)

Obs.—This curious species approaches to the group of *J. globosa* and *pectinata*. It is remarkable for the development of the posterior appendage of the left valve, the inflation of the callous portion, &c.

The above two species are interesting additions to a genus which has hitherto been quite limited in species. The discovery of two (possibly three) new species of *Pholadacea* inhabiting the West Coast of North America, occurring within a few months, proves the truth of the remarks I made on this subject in the Proc. A. N. S., 1862, that, "greatly as the number of species have been increased by modern research, it is evident, from the general diffusion of the Order throughout the world, and from the incompleteness of our researches in those regions, which appear most to abound in them, . . . that the number at present known must be indeed a very small proportion of those which future investigation will probably reveal to us."

ZIRPHÆA GABBII, Tryon, plate 1, fig. 1.

Shell large, transverse, obliquely divided by a deep furrow proceeding from the umbonal apex to the basal margin and forming a corresponding rib on the internal surface of the valve. Posteriorly to the furrow the shell is marked only by growth lines which, in crossing it, are elevated into sharp ribs, in which character they are continued to the anterior margin. The portion of the shell anterior to the radiating furrow is ornamented with numerous longitudinal ribs, approximating in pairs and rendered acutely scabrous at the intersection of the rib-like growth lines.

Ventral anterior margin emarginate. Dorsal anterior margin reflected and closely appressed over the beaks. Posterior dorsal margin declining somewhat to the quadrately rounded posterior lateral end. Color white.

Dimensions.—Length 1¼ inch; breadth 2⅓ inch. Breadth anterior to furrow 9-10 inch; posterior to furrow 1⅓ inch.

Hab.—Coast of Japan?—W. M. Gabb. My cabinet.

Observations.—This species is very closely allied to *Z. crispata* of our Atlantic coast, but may be distinguished by its more numerous and more scabrous ribs, by its greater proportionate width and the very disproportionate size of its anterior and posterior areas.

Can this be the species which Dr. Carpenter, in his Catalogue of our West Coast Mollusca, refers with doubt to *Z. crispata?* In the exchanges of commerce it may have been brought there, or, (no strange distribution in this family) it may even *exist* on both shores of the Pacific.

I received a single valve, somewhat mutilated, from our fellow member, Mr. Wm. M. Gabb, now of San Francisco, Cal., and name it after him, in recognition of the active service he is rendering to the science of Conchology in his adopted State.

XYLOTRYA SETACEA, Tryon, plate 1, fig. 2, 3.

Shell large, of nearly equal length and breadth. Beaks high, narrow, incurved, and thickened, the apex lower than the auricle, which is long, moderately wide, extending more than half the length of the valve and joining the medial portion by a rounded obtuse angle. Anterior area obliquely triangular, not more than half the length of the auricle, its upper edge protected by a rib culminating dorsally in a sort of knob. The anterior margin of the medial portion of the valve is straight, forming an acute angle with the triangular area; the posterior margin is oblique and somewhat convex. The junction of the auricle is marked externally by a depression of the surface, and internally by a projecting ledge. Apophysis short, oblique, broad. Base of valve tuberculate internally.

The valve is white, tinged with pink anteriorly and slightly glossy. The anterior area, which is separated from the body by a deep, narrow, sulcation, is sculptured by about thirty sharply cut, prominent, transverse ribs. The body is marked, first, by a narrow longitudinal area which is closely striate; then by a narrow double rounded rib, the surface of which is triangularly striate; then by a depressed space equally wide, with its sides accurately defined, and transversely sculptured. The whole surface of the body and auricle posteriorly is

unmarked, except by growth lines, and the depression of surface at the commencement of the latter.

Pallet large; the jointed portion about the same length as the stalk, rather wide, with lateral extremities acuminate and inclining upwards. Sides of the joints fringed. These joints number about sixteen or eighteen. Stalk very slender and rounded.

Dimensions.—Length and breadth of valves about ½ inch. Length of pallets 1¼ inch. Breadth of upper portion of pallets about ⅛ inch.

Hab.—Bay of San Francisco, Cal.—Rev. J. Rowell. My cabinet and cabinet of Mr. Rowell.

Observations.—The valves of this species bear a very strong resemblance in size and form to *T. megotara*, Hanley. From *X. bipennata*, Turton, it is distinguished by the basal margins of the auricle and anterior area not being on the same transverse line, and by its broader, more closely jointed and shorter pallets.

From *X. cucullata*, Norman, it is distinguished by its different surface markings and the sharp angle of the anterior area with the body.

X. fimbriata has a shorter pallet and much smaller and differently formed valve; the same may be said of *X. minima*. *X. Stutchburyi* has very *fine* striæ on the anterior area, and the pallets also differ. The latter, in the present species, are somewhat like those of *X. palmulata*, Lam., but are longer than in that species, and differ in the relative length and diameter of the stalks, and also by their fringed joints.

Our fellow member, Dr. A. L. Heermann, informed me some time since, of the existence of a shipworm at San Francisco, which, at the period of his visit there, (several years ago,) was committing great ravages in the destruction of the wharves of that city. It appears since to have become rare, and it was only after diligent inquiry that my friend, Mr. Gabb, found specimens in the collection of Rev. J. Rowell, who kindly sent me one.

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Note on Diplothyra.

In Am. Journ. Science and Arts, May, 1863, p. 455, is a note by Dr. Stimpson on my genus *Diplothyra*, in which he asserts its identity with *Martesia* upon the ground that the additional dorsal valve is not a generic character, being sometimes developed by *Martesia cuneiformis*. Although many of the specimens of *Diplothyra Smithii* do not exhibit the double dorsal valve, I attribute it to the *suppression* or *abortion* of that appendage, and regard the double valve as the normal condition of the genus and species. The shells which possess it are generally the largest and best examples, and its non-appearance in others is not surprising when we consider the character of the substance in which they reside, and the evident compression and distortion of many of the specimens. The species of the family *Pholadidæ* are very liable to distortion and to the suppression or division of their dorsal plates; for instance, in *Dactylina dactylus* they are frequently not developed at all; in *Martesia striata* several specimens before me exhibit incipient stages of a division of the umbonal plate into three, but I certainly would not on this account doubt the generic distinctness of *Penitella*, which is characterized by having three valves.

If Dr. Stimpson's *M. cuneiformis*, when perfect specimens are selected, exhibit dorsal valves corresponding with my figure of *D. Smithii*, then either *M. cuneiformis* must be a *Diplothyra*, or else the specimens alluded to are not veritable *cuneiformis*. I have very closely examined many specimens of *cuneiformis*, *striata*, *obtecta*, etc., but have not detected a second proper umbonal valve upon them.

Mr. S. P. Woodward, some years since, regarded the differences in the umbonal plates as expressing *specific* value only, but his theory has since found no supporters. I have closely re-examined all the *Pholades* in my collection, and weighed anew the value of the specific and generic characters, and the

result is a renewed conviction that *D. Smithii* is a very distinct species and that *Diplothyra* possesses in its umbonal plates a good generic character.

Note on Penicillinæ.

In a review of my work on *Pholadacea*, published in the American Journal of Science, Prof. Gill suggests that *Penicillinæ* be elevated into a family, distinct from *Gastrochænidæ*, on account of the development of tentacles on the mantle-margin of the animal of the former. I have reviewed the subject and find no reason to alter the conclusions to which I originally arrived, namely, to regard this difference in the animal, in connection with differences in the shell, as possessing the value of a subfamily. Indeed, Prof. Gill has himself separated, as a subfamily only, (*Ceriphasinæ*) our American *Melanians*, which differ from the exotic species in having a mantle with a plain instead of fringed or tentaculate margin.

Descriptions of two new Species of Fresh Water Mollusca, from Panama.

BY GEO. W. TRYON, JR.

1. Planorbis Fieldii, Tryon, plate 1, fig. 4, 5.

Description.—Shell small, moderately thick, polished, unmarked except by growth lines. Whorls three, almost equally convex above and below, and rapidly enlarging. Spire not much depressed, umbilical region of moderate width and not deep. Outer lip regularly rounded and almost equally expanded above and below the plane of the volutions. The aperture is slightly oblique.

Dimensions.—Diam. maj. 6, min. 4½ millim. Alt. 2½ millim.

Hab.—Panama. Capt. Field, U. S. N. Coll. A. N. S.; my coll.

Observations.—This species resembles some varieties of *Pl. deflectus*, Say, in which the whorl is not deflected at the aperture; but it differs in the sides being regularly rounded instead of carinate, as in that species, and also in the dilation of the aperture above and below the plane of the shell, in this respect resembling somewhat *Pl. corpulentus*, Say.

Pl. Panamensis, Dunker, is a very different shell from *Fieldii*, being more depressed, differently sculptured, etc.

Capt. Field presented to the Academy about a dozen specimens of this species, together with a new *Amnicola* (herein described,) and a few specimens of *Succinea recisa*, Morelet, all collected by himself at Panama.

2. Amnicola Panamensis, Tryon, plate 1, f. 6

Description.—Shell conical, smooth and shining, consisting of four rapidly increasing, very convex whorls. Sutures deeply impressed; spire prominent, apex acute. Aperture rounded; umbilical region slightly perforate.

Dimensions.—Length 4½ millim. Diameter 3 millim.

Hab.—Panama. Capt. Field, U. S. N.; coll. A. N. S.

Observations.—This shell is very like *A. decisa*, Hald., in form, but the whorls are more convex and the aperture nearly rotund. It also resembles *A. Cincinnatiensis*, Anth., which is, however, a more slender species. The shell is smaller than either of the above.

I think this is the first species of Amnicola found upon the Isthmus.

Description of a new Exotic Melania.

BY GEORGE W. TRYON, JR.

Melania Helenæ, Tryon, t. 1, f. 7.

Description.—Shell turrited, whorls eight or nine, angulated in the middle,

rather flattened above, convex below, sutures deeply impressed. Surface spirally nodulously ridged, the nodules running into waved longitudinal ribs. Aperture narrow, a little produced in front, contracted behind. Outer lip sinuous, angulated in the middle.

Dimensions.—Length 20 mill. Diam. 8 mill.

Hab.—Philippine Islands. My cabinet.

Observations.—This shell is allied to *Melania perfecta*, Mousson, from Java, but differs in being angulated, and in having a longer, narrower aperture; it is also a little smaller and the apicial whorls are sculptured, not smooth. Since the above description was written, I have observed in the collection at the Academy fine specimens of *Melania Mauiensis*, Lea, the sculpturing of which somewhat resembles this species, but they are much stouter, more obtuse shells, with the periphery not angulated.

Descriptions of new Species of Fresh Water Mollusca, belonging to the Families AMNICOLIDÆ, VALVATIDÆ and LIMNÆIDÆ; inhabiting California.

BY GEO. W. TRYON, JR.

The following species of Shells sent to me by my friend Mr. Wm. M. Gabb, were principally collected by Rev. J. Rowell, of San Francisco,—a gentleman who has devoted much time to the study of the Mollusca of the State of California.

It is not without considerable hesitation that I propose new species in genera wherein the variations of form, due to climatal and other influences, are so great, and where the geographical distribution is frequently so extended; and it is only after very extensive comparisons with the related species which have already been characterized, that I select for description those among the suite sent to me which appear to be most distinct, leaving others unnamed, until a more extended exploration of the State shall give us a more perfect knowledge of the extent and relations of the Molluscous fauna inhabiting its waters.

A considerable number of shells belonging to the above families, appear to inhabit the entire breadth of the continent; adding to these the forms ascertained to be peculiar to Oregon and California, we find already decided indications that these States form the metropolis of the fresh-water Pulmonobranchiates of North America.

I have added to the descriptions of new species, a list of those already described, which have been sent to me by Mr. Gabb, because, in most cases, the localities are new and interesting.

AMNICOLIDÆ, Tryon.

1. Amnicola Rowellii, Tryon, t. 1, f. 8, 9.

Description.—Shell depressed, wider than high, consisting of three and a half whorls, which are regularly convex and rapidly enlarging; spire small, but little elevated, apex acute, sutures well marked; base convex, except that the region surrounding the umbilicus is flattened and inclining towards the axis, its outer boundary, consequently, is marked by an angle; umbilicus small but very distinct; aperture half ovate, the labrum well rounded and thin, the labium but slightly rounded, thickened, elevated from the body-whorl, forming an acute angle with the labrum above, and not impinging on the umbilicus. Surface marked with close, regular, minute striæ, which become enlarged in the flattened umbilical region into sharp crowded lines visible without a glass.

Color light horn or yellowish, operculum darker. Operculum paucispiral, the lines of accretion very distinct and regular.

Dimensions.—Length 2·5 mill. Diam. maj. 4. mill., min. 3 mill. Length of apert. 2 mill., breadth 1½ mill.

Hab.—Clear Lake, California. Rev. J. Rowell. My cabinet and cabinet of Mr. Rowell.

Observations.—This species cannot be compared with any other hitherto described, being much more depressed, and widely distinct in the form of the umbilical region.

It may possibly form a species of the genus *Somatogyrus*, recently proposed by my friend, Mr. Theo. Gill, for a small Mollusc from Iowa, which I described in the Proceedings of the Academy for September, 1862.

2. Pomatiopsis Binneyi, Tryon, t. 1, f. 10.

Description.—Shell minute, elongated, consisting of four to five very convex whorls; apex somewhat obtuse; aperture ovate or nearly suborbicular, both lips rounded; umbilicus very small. Color light-horn.

Dimensions.—Length 3 mill. Diam. 1·6 millim. Length apert. 1·25 mill., breadth 1 mill.

Hab.—Bolinas, California. Rev. J. Rowell. My cabinet and cabinet of Mr. Rowell.

Observations.—Seven specimens of this very small and exceedingly fragile species were sent to me; they exhibit, however, all the stages of growth from the very young to adult form. None of them retained the operculum.

It is much smaller than any other species of *Pomatiopsis*, and is not likely to be confounded with any of them. It approaches nearest in form to two European species of *Bythinia*, *B. acuta* and *B. viridis:* the former, however, has a more lengthened, acute spire, and the latter is a more robust and ventricose shell.

Amnicola protea, Gould, from Colorado Desert, described in Proc. Bost. Soc. N. Hist. v. 129, Oct., 1855, (read Dec. 20, 1854,) is the same as *Melania exigua*, Conrad, from same locality. Described in Proc. Acad. Nat. Sci. p. 269, Feb., 1855. (Read Feb. 13th, 1855.) The shell belongs to a new genus of the family Amnicolidæ. Some small fossil shells sent to me by my friend, Dr. F. B. Meek, appear to belong to the same genus. Of course Mr. Conrad's specific name will take precedence over that of Dr. Gould.

VALVATIDÆ.

3. Valvata virens, Tryon, t. 1, f. 11.

Description.—Shell turbiniform, consisting of four well rounded whorls, spire elevated, apex acute, sutures deeply indented; periphery almost angulated; umbilicus very wide; aperture oval or nearly round, the peristome merely touching the body above. Surface closely striate. Color varying from brilliant to dark green.

Dimensions.—Height 5 mill. Diam. maj. 5 mill., min. 4 mill. Length, apert. 2·5 mill., breadth 2 mill.

Hab.—Clear Lake, California. Wm. M. Gabb. My cabinet and cabinet of Mr. Gabb.

Observations.—A number of specimens of this species are before me, most of them being about two-thirds grown. It has no American analogue.

LIMNÆIDÆ.

4. Limnæa Adelinæ, Tryon, t. 1, f. 12.

Description.—Shell thin, semi-transparent, body whorl large, wide, convex; spire small, consisting of five convex volutions, attenuating rapidly to an acute apex, sutures impressed; inner lip thin, reflected, but not covering the umbilical fissure, which is narrow; columella twisted; color light-horn, polished within the aperture, outer lip tinged with red within.

Dimensions.—Length 14 mill. Diam. maj. 8·5 mill. Length of aperture 9 millim., width 5 millim.

Hab.—San Francisco, California. Rev. J. Rowell. My cabinet and cabinet of Mr. Rowell.

Observations.—This shell is nearly allied to *L. catascopium*, Say, and perhaps more nearly to *L. intermedia*, Mich., of Europe. From the former it may be distinguished by being more fragile, more transverse, with a smaller, more rapidly attenuating spire, but principally by the presence of an umbilical fissure, which in *catascopium* is entirely concealed by the appression of the labium. In this and other respects it is very near to *L. intermedia*, which, however, has a shorter spire, of fewer volutions. I name this species after my sister, Miss Adeline S. Tryon, who has evinced much interest in conchological pursuits.

5. Limnæa Traskii, Tryon, t. 1, f. 13.

Description.—Shell elongated, the spire drawn out and apex acute. Whorls six, convex, almost shouldered, sutures deeply impressed. Aperture small, oval, labrum well rounded, labium slightly rounded, not appressed below, nor covering the umbilicus, which, though small, is very distinct. Color light-horn or cinereous.

Dimensions.—Length 16 mill., diam. 8 mill. Length of aperture 7 mill., breadth 5 mill.

Hab.—Mountain Lake, California. Rev. J. Rowell. My cabinet and cabinet of Mr. Rowell.

Observations.—At first I was disposed to regard this shell as a variety of *L. proxima*, Lea, but a comparison with the type specimens of that species shows the following differences: the volutions are not so oblique, and are more rounded, the aperture is also more rounded and the shell is umbilicated.

Named in honor of Dr. J. B. Trask, one of the pioneers of Californian Conchology.

Limnæa caperata, Say. San Francisco. Oakland.
Limnæa fragilis, Linn. San Francisco. Mountain Lake.
Limnæa umbrosa, Say. San Francisco. Mountain Lake.
Limnæa reflexa, Say. Mountain Lake.

6. Physa Gabbii, Tryon, t. 1, f. 14.

Description.—Shell large, thin, closely striated by the lines of growth; body whorl inflated, its upper half flattened so that the labrum appears angulated in the middle; spire moderate, apex acute, whorls six, convex, with distinct sutures.

Color light corneous, very much polished within; lip margined with red.

Dimensions.—Length 25 mill., diam. 13 mill., length of aperture 15 mill., breadth 8 mill.

Hab.—Mountain Lake, California; Rev. J. Rowell. Santa Ana River, Los Angelos Co., California; Wm. M. Gabb. My cabinet and cabinets of Mr. Rowell and Mr. Gabb.

Observations.—Several specimens of this fine large species were communicated to me by my friend Mr. Wm. M. Gabb, after whom I take great pleasure in naming it. It is a much larger, thinner species than *Ph. heterostropha*, Say, and is at once distinguished by the peculiar flattening of the superior portion of the body whorl. The same character will also distinguish it from *Ph. bullata*, Gould, in which species the aperture moreover is proportionately longer.

Physa gyrina, Say. Mountain Lake.
Physa costata, Newcomb. Clear Lake. (Original loc.)
Physa humerosa, Gould. Colorado Desert. (Origual loc.)
Physa virgata, Gould. Santa Ana River, Los Angelos Co.
Physa heterostropha, Say. Dry Creek, Butte Co. Clear Lake, Centerville, Oakland.

7. Ancylus fragilis, Tryon, t. 1, f. 15.

Description.—Shell very small and fragile, sides nearly parallel or slightly incurved in the middle, but diverging anteriorly; ends rounded. Apex elevated, acute, curved backwards, with about two-thirds of the shell anterior to it.

Dimensions.—Size of the largest specimen. Length 4 mill., breadth 1·15 mill., heigth 1 mill. Most of the specimens do not exceed two-thirds of these dimensions.

Hab.—Laguna Honda, California. Rev. J. Rowell. My cabinet and cabinet of Mr. Rowell.

Observations.—This species is smaller, thinner, and wants the convex lateral margins of our *Anc. rivularis*, Say. It agrees with that shell, however, in the greater width of its anterior end, while in the shape of its lateral margins it resembles *Anc. parallelus*, Hald. It is much the smallest of our species.

PLANORBIS AMMON, Gould. Pajaro River, Monterey Co.
PLANORBIS TRIVOLVIS, Say. Mountain Lake.
PLANORBIS GRACILENTUS, Gould. Mountain Lake.
PLANORBIS VEMICULARIS, Gould. Mountain Lake.
PLANORBIS ORERCULARIS, Gould. Mountain Lake.
PLANORBIS NEWBERRYI, Lea. Clear Lake.

(Communicated by the Smithsonian Institution.)

Notes on the BIRDS of Jamaica.

BY W. T. MARCH.

With remarks,

BY S. F. BAIRD.*

I.

VULTURIDÆ.

1. CATHARTES AURA.—The John Crow Vulture is the scavenger of tropical towns and villages, and so highly are his services in this respect appreciated, that he is, in some of the islands, considered entitled to legislative protection. An ordinance of the corporation of the city of Kingston imposed a penalty on any person destroying one of them within the precincts of the city. The occurrences related by Mr. Gosse, in "Birds of Jamaica," would seem to lead to the inference that the two senses of seeing and smelling, sometimes singly, and at other times unitedly, give to the *aura* the facility with which he traces his food; but they are not conclusive. Is his sense of smelling so acute as to enable the John Crow to distinguish, at a distance, the stench of a putrid carcass from the atmosphere of offensive effluvia emanating from, and floating about, his own vile body? With the knowledge that, in the tropics, a dead carcass, or dying animal, and often even fresh garbage, is quickly surrounded and covered by swarms of flies, hovering, and buzzing above and about it, or the place in which it is deposited, may we not be equally led to the conclusion, that the Vulture is directed by the flies, and that sight alone is the sense by which he finds his necessary food? By whatever sense he is led, he certainly traces his food from a far distance. When a dead carcass has been discovered by some, numbers of other Vultures are directed by the motion of those gathering together, and soaring at a great height, sweeping round and round in irregular circles. Shortly after the commencement of the Rebellion of 1831, and long after its suppression, the Aura Vulture was a rare object in the landscape of the midland and eastern parishes; they had all departed for the scene of carnage in the West, where they remained for many months.

The *Cathartes aura* breeds in solitary pairs. I have never seen them, or

*Specimens of most of the birds, and of the eggs described, have been presented by Mr. March to the Smithsonian Institution, under the numbers which they bear in his communication. (E.

heard of their associating during the season of incubation. In the hills they select a spot sheltered by overhanging rocks, or trees, for their breeding place. At Walton, in the Moneague district of Saint Ann, a pair breeds annually on a rock known as the John Crow Rock, the young birds never remaining; one pair alone retaining possession of the homestead. In the plains or valleys, they generally take the base of some large tree for their resting-place. I have often seen eggs and young birds found on the limestone hills, in the neighborhood of Spanish town, as well as from the Port Hudson, and Healthshire ranges and the adjoining woodlands. In 1834, I found a pair of young John Crows, under a Fustic tree, in a wide belt of Pinguins, not 500 yards from the residence of Heartsease Penn, three miles from Spanish Town. In 1842, I found two eggs in a thick bush, under the shade of an Inga Saman, on the river bank at Rodons Penn, a mile and a half from town; and in 1861, a pair of young birds were found under a large spreading Cashaw tree, a few feet from a path leading to a cottage on a Penn, near the race-course. On every occasion of the finding of eggs, or young birds, there have been only two, and these have always been discovered on the bare ground, without the slightest apology for a nest, save any decaying leaves or other vegetable substance fortuitously on the spot. The eggs are oval, and measure $2\frac{3}{4}$ by 2 inches, or nearly so; the ground color is cream, or creamy, or clayish white, with dashes and spots, and some irregularly formed blotches of umber brown, intermixed with grey slaty cloudings beneath; the ground coloring and markings of some are dark, whilst in others they are much lighter.

186. Cathartes atratus.*—The black, or Carrion Crow Vulture, if we are correct in the identity, is a recent settler in Jamaica. The first pair observed were captured at Port Henderson, I think, in 1847, for Mr. Justice Macdougal, who sent them to the late Earl of Derby. Individuals of the species are still observed about Port Henderson and the Healthshire Hills, and occasionally over Spanish Town. In 1861, a specimen, apparently a male, was caught in my garden in the Town, but from the carelessness of a lad it escaped before it was examined, previous to its being prepared. On two occasions, whilst travelling to Saint Anns, I have observed them; the first time there were two · the second, three—passing rapidly up the mountain gorge, near Miss Kingston's tavern, on the Walks Road, through which the Rio Cobre flows, from St. Thomas, in the vale, to the lowlands, on its onward course to the sea; and Mr. Hill informs me that he has, on several occasions this year, seen them about the same place. The species is yet too rare to justify any speculation as to their becoming domiciled in any number, or what their general habits may be when they become permanent settlers. Their flight is in angles or straight lines, rarely in circles, like that of the Aura, and then the circles are more circumscribed.

187. Cathartes ——?—In the autumn of 1828, I obtained from Great Salt Pond a specimen of a black Vulture, mottled with white spots, about the size of *Pandion carolinensis*. It was so obese, with deep fulvous fat, that I had much difficulty in preserving it in part. I sent the specimen to the Royal Dublin Society, but have received no information of its having been identified with any described species. I did not take the dimensions.

FALCONIDÆ.

2. Buteo borealis.—The Chicken Hawk is distributed generally throughout the island, but is not more common than tue Pigeon Hawk; though from his habits he is more frequently observed. He prefers an open country, with some lofty trees about. He was formerly often seen, and heard by himself, or with his mate, soaring in circles, and his peculiar cry, ping-ye-e, heard overhead in Spanish Town; but of late years, since the pastures in the vi-

* Not mentioned by Gosse.

vinity of the town have been allowed to grow up into bush and brush, he is seldom seen or heard near the Town. He now resorts to those places where the grounds and commons are more open and unencumbered by low or tangled growth of underwood. The Chicken Hawks do not confine themselves to any particular mode or place of breeding; comparative height appearing to be the chief object. They generally select the loftiest tree in the locality, without reference to its being inaccessible or otherwise, where they construct their nest at the highest available point. In the lowlands, the silk cotton tree is generally selected for the purpose, but the Cashaw or Hogg Plum is as often used. I have sometimes met with a nest in a Cashaw tree, not more than 20 feet from the ground, quite accessible, and near a frequent path. Several pairs of young birds have been at different times taken from the roof of the turret of the belfry of the Spanish Town Cathedral Church. The last pair I saw was taken in 1852. The nest is a platform of dry sticks more than a foot across, and two or three inches thick; the bed of the nest is about six inches across and two inches deep, of grass, inner bark and leaves; it usually contains 4 or 5 eggs, nearly spherical, $2\frac{1}{4}$ by $1\frac{3}{4}$ inches, of a dirty or clayish white, dashed with blotches and spots of vandyke, and umber brown, often running with a lighter shade into the ground color.

3. Falco anatum.—The great-footed, or Duck Hawk, is an annual visitor, following the flocks of migratory ducks, which resort here in the autumn and early winter months, and sometimes on their return, passing over in the spring. I have obtained specimens in October and the intervening months until January, and again in April. It is of larger dimensions than the Peregrine Falcon, and I have not seen it here in the light plumage of the lattter.

I obtained a specimen of the true Peregrine Falcon at the same time with the black and white Vulture. It was evidently a trained bird, as it was very docile, and had the leathern collar, or gorget, on its neck. It was shot at Great Salt Pond, following a flock of Teal. The wing was broken near the shoulder joint; it lived for a fortnight, when it died from mortification of the wound. This specimen I also sent to Dublin.

188. Tinnunculus ——?—A small brown Hawk,* knowu as the Sparrow Hawk, and which I take to be of this genus, is often met with in the mountains. I have several times seen it sweeping past in rapid flight, but have not yet obtained a specimen, or gleaned any informatiou of its habits.

4. Hypotriorchis columbarius.—The Pigeon Hawk is a permanent resident more frequently found in the hills thau the plains. Sometimes he is seen perched on a lofty tree, but seems to prefer lurking in low bushes or trees, from whence he swoops suldeuly and directly ou his prey. The nest is generally constructed on some lofty tree, often screened by thick foliage, and is a slight platform of sticks and grass, matted with some softer material, as grass, inner bark or leaves; the only one I have ever collected contained four round oval or spherical eggs, measuring $1\frac{3}{8}$ by $1\frac{1}{8}$ inches, of a dull or clayish white, marked with sepia and burnt umber, confluent dashes and splashes irregularly distributed, principally about the middle and larger end. Some few years ago, I saw four eggs taken from a nest, described as above, in the lower St. John's Mountain; the eggs were oblong oval, about the same size as the last, and nearly covered with chocolate and umber blotches; probably they belonged to two distinct species.

6. Pandion Carolinensis.—The Fish Hawk is regular in his autumnal visits, confined, however, to the coast. An intelligent and observant sportsman, then residing at Port Henderson, told Mr. Hill and myself, many years ago,

* This may be a *Tinnunculus*, or a small *Accipiter*; perhaps *fringilloides*: or, more unlikely *fusous*. (B.)

that he once found a nest of this Hawk, on a large dead tree in Dawkin's Salt Pond, near Port Henderson.

7. NAUCLERUS FURCATUS.—I have never met with a specimen of this Hawk, but Mr. Hill has. It is a rare visitor.

5. MORPHNUUS URUBUTINGA.—This is also a rare visitor. I saw a large bird answering the description at Heartsease Penn, where I resided in 1835. It came to a lofty fustic tree daily, about three o'clock in the afternoon, for some three weeks, and then disappeared. I made several attempts to shoot it, but it was too wary.

In 1858 I obtained near Spanish Town a red shouldered Hawk, which I also sent to Dublin, at the time believing it to be an immature specimen of *Buteo borealis*, but I am now inclined to think it was another species.

STRIGIDÆ.

9. STRIX PRATINCOLA.—The Barn Owl is very common in all parts of the island. It breeds in caves, hollow trees, and old buildings. It is often found beneath the roofs and ceilings of inhabited houses and plantation buildings, where it finds a way of ingress. Eggs and young birds were often taken from the interior of the belfry turret of the Spanish Town Cathedral Church, until the loops by which they entered were blocked up. This Owl makes no nest, but deposits 4 or 5 eggs on any trifling collection of debris or rough materials found on the spot. The eggs are generally in different stages of incubation. They are chalky white, and measure $1\frac{3}{4}$ by $1\frac{1}{4}$ inches, some a little more or less.

8. EPHIALTES GRAMMICUS.—Though not uncommon, and his cry of whoo-whoo-hoo, is often heard in some districts, yet from the obscure color, and stealthy, noiseless flight at dusk, or at night, the Eared Owl escapes observation. The only specimens I have obtained during many years were two ; one was knocked down at Government Penn, in broad day, from an old blooming cherry tree, clothed with a mass of trailers of convolvuli ; the other was shot one evening at Great Salt Pond Penn, in the same neighborhood. On obtaining the first specimen, I examined the tree and found two young, half-fledged birds on a matting of leaves, in a decayed hollow at the top of the tree. I have been informed that eggs and young birds have been taken from old pigeon cotes at Great Salt Pond and Hoghole Penn's, but I have never seen the eggs, unless the two next referred to belong to it. I have lately a fine specimen of a female from the Saint Catherine's Hills.

225. My sons found this year (1862), at Reid's Penn, in the vicinity of Great Salt Pond, two eggs, in a deep cup, roughly constructed of dried sticks and lined with twigs, grass and leaves, in the topmost branch, and concealed by the thick foliage of a tall Genep tree (*Mellicocea bijuga*). I know of no bird in that district to which these eggs can be assigned, unless they belong to *Piaya pluvialis*, or to *Ephialtes grammicus*, as they are much too large for the small brown owl ; and the Patoo, as I am infomed, lays a very different egg on the ground. The eggs referred to are chalky white, and vary in size ; one is $1\frac{1}{2}$ by 1 inch, the other $1\frac{3}{4}$ by a trifle more than 1 inch.

195. In 1857 I obtained two specimens of a small brown owl, from Great Salt Pond Penn, but know nothing of the character or habits of the species. It is probable the small wood owl of Sloane. It is the owl referred to by Mr. Hill, in " Notes of the Year," and quoted by Mr. Gosse, page 22.

SCANSORES-CUCULIDÆ.

89. CROTOPHAGA ANI.—The Savanna blackbird is one of the common inci-

* This may be a *Tinnunculus*, or a small *Accipiter*; perhaps *fringilloides*: or, more unlikely *fuscus*. (B.)

dents to the lowland landscape; it generally builds on the low branches of trees or bushes, heaping together a mass of sticks and leaves, in the centre of which is formed a shallow bowl, with softer materials. Each female lays 4 eggs; several pairs, however, usually occupy one nest, in which 20 or more eggs are often found. These are oval, or oblong oval, rounded at both ends, measuring from $\frac{5}{16}$ by 1 inch, to $1\frac{1}{2}$ by $1\frac{1}{8}$, seagreen, covered with a white chalky substance, removed by washing. In the absence of the birds, which, however, is rarely the case after incubation commences, the eggs are covered np with leaves. I have never heard of the Savanna blackbirds being taught to speak. Whenever a flock of Guinea fowls is feeding, the Ani are often to be found at hand, as it were keeping guard, and giving instant alarm on the approach of any one.

87. Coccyzus dominicus.* The May Witch is a constant resident in the island, and more common in the lowlands during the summer than *C. seniculus*. It breeds from March till July, and builds in the low branches of trees or shrubs, or on penguin fences. The nest is a structure of a few dry sticks, so loosely put together that it falls to pieces on any attempt to remove it; 3, rarely 4 eggs are laid; they are glaucous green oval, generally though not always round at both ends, and vary in size from $1\frac{1}{4}$ by $\frac{7}{8}$ to $1\frac{3}{8}$ by 1 inch.

88. Coccyzus seniculus.—The nest of the black-eared Cuckoo is sometimes though not so frequently found in the same localities, and at the same times as those of its congener. The nidification, form, color and dimensions of the eggs are so like that the ownership of a nest can only be determined by the presence of the bird.

There is another Cuckoo often met with in the Mangrove swamps, on the seacoast, known as the Mangrove Cuckoo. It closely resembles the May Witch, except in its smaller size. It is, I think, only a visitor. This may be the *C. erythrophthalmus* or an allied species.

Descriptions of fourteen new species of MELANIDÆ and one PALUDINA.

BY ISAAC LEA.

Goniobasis Milesii.—Testâ lævi, subfusiformi, olivaceâ, evittatâ; spirâ subelevatâ; suturis irregulariter impressis; anfractibus senis, subinflatis; aperturâ submagnâ, subrhomboideâ, intus subfuscâ; labro acuto, vix sinuoso; columellâ purpureâ, parum incurvâ.

Habitat.—Tuseola County, Michigan, M. Miles, State Zoologist.

Goniobasis lithasiodes.—Testâ lævi, subfusiformi, corneâ, evittâ; spirâ conoideâ; suturis impressis; anfractibus senis, subconstrictis, supernè planulatis; aperturâ grandiusculâ, rhomboideâ, intus albidâ; labro acuto, parum sinuoso; columellâ albâ, inflectâ, parum contortâ.

Hab.—Ohio, J. P. Kirtland, M. D.

Goniobasis Decampii.—Testâ plicatâ, infernè striatâ, valdè attenuatâ, tenui, corneâ, evittatâ; spirâ subulatâ; suturis linearibus, impressis; anfractibus instar denis, subconvexis, supernè plicis aliquantò flexis; aperturâ parvissimâ, subrhomboideâ, intus albidâ; labro acuto, parum sinuoso; columellâ albidâ incurvâ et contortâ.

Hab.—Huntsville, Alabama, Wm. H. DeCamp, M. D., Surgeon U. S. Army.

Goniobasis informis.—Testâ lævi, cylindrico-conicâ, tenebroso-cornea, evit-

* This species is the *C. americanus*, or Yellow-billed Cuckoo, of Gosse. I find it, however, to be quite distinct from the North American bird, and identify it with the *C. dominicus*, of the older authors: a species generally referred to the *C. seniculus*, of Aud., *C. minor*, of Cabanis, Baird and others. (B.)

tatâ; spirâ parum exsertâ; suturis irregulariter impressis; aperturâ parviusculâ, subovatâ, intus albidâ; labro acuto, valdè sinuoso; columellâ albâ et valdè contortâ.

Hab.—Falls of the Ohio at Louisville, W. H. DeCamp, M. D.

Goniobasis Louisvillensis.—Testâ lævi, fusiformi, tenebroso-corneâ, evittatâ; spirâ curtâ; suturis irregulariter impressis; anfractibus instar quinis, subconvexis; aperturâ subgrandi, longo-ellipticâ, intus albâ; labro acuto, vix sinuoso; columellâ albâ, supernè incrassatâ, aliquantò contortâ.

Hab.—Falls of the Ohio at Louisville, W. H. DeCamp, M. D.

Goniobasis infantula.—Testâ lævi, fusiformi, tenebroso-corneâ, valdè vittatâ; spirâ curtâ; suturis vix impressis; anfractibus quinis, supernè planulatis; aperturâ subgrandi, ovatâ, intus vittatâ; labro acuto, vix sinuoso; columellâ purpureâ, incrassatâ et contortâ.

Hab.—Falls of the Ohio at Louisville, W. H. DeCamp, M. D.

Goniobasis aterina.—Testâ lævi, subfusiformi, atrâ vel virido atrâ, crassiusculâ; spirâ obtusâ; suturis regulariter impressis; anfractibus senis, convexiusculis; aperturâ subgrandi, subovatâ, intus purpureâ, aliquantò albidâ; labro acuto, vix sinuoso; columellâ inflectâ, purpureâ, incrassatâ et contortâ.

Hab.—Gap Spring, Cumberland Gap; and Rogers' Spring, West of Fincastle, East Tennessee, Capt. S. S. Lyon, U. S. Army.

Goniobasis porrecta.—Testâ striatâ, attenuatâ, tenebroso-fuscâ, uno-vittatâ; spirâ attenuatâ, acuminatâ; suturis valdè impressis; anfractibus novenis, planulatis; aperturâ parvâ, ovatâ, intus albidâ vel tenebrosâ; labro acuto, parum sinuoso; columellâ inflectâ et contortâ.

Hab.—Gap Creek and Spring, Cumberland Gap, East Tennessee, Capt. S. S. Lyon, U. S. Army.

Goniobasis vittatella.—Testâ lævi vel subcarinatâ, conoideâ, tenebroso-fuscâ, uno-vittatâ; spirâ subacuminatâ; suturis linearibus; anfractibus octonis, planulatis; aperturâ parvâ, subrhomboideâ, intus tenebrosâ; labro acuto, parum sinuoso; columellâ inflectâ et contortâ.

Hab.—Cumberland Gap, East Tennessee, Capt. S. S. Lyon, U. S. Army.

Goniobasis Cumberlandiensis.—Testâ lævi, acuminato-conoideâ, subtenui, rufo-fuscâ; spirâ subelevatâ; suturis regulariter impressis; anfractibus octonis, convexiusculis; aperturâ parviusculâ, subrhomboideâ, intus albidâ vel purpurescente; labro acuto, parum sinuoso; columellâ albidâ vel purpureâ, inflectâ et contortâ.

Hab.—Gap Spring, Cumberland Gap, Capt. Lyon; and Knoxville, Tennessee, Wm. Spillman, M. D.

Trypanostoma Currieranum.—Testâ carinatâ, valdè attenuatâ, tenebroso-fusco-vittatâ; spirâ valdè exsertâ; suturis linearibus, vix impressis; anfractibus, instar denis, planulatis; aperturâ parvâ, rhomboideâ, intus vittatâ; labro acuto, valdè sinuoso; columellâ albidâ et valdè contortâ.

Hab.—Florence, Alabama, W. H. DeCamp, M. D.

Trypanostoma Lyonii.—Testâ lævi, conicâ, virido-corneâ, evittatâ; spirâ subelevatâ; suturis impressis; anfractibus instar senis, convexis; aperturâ parviusculâ, rhomboideâ, intus albidâ; labro acuto, valdè sinuoso; columellâ albâ, infernè incrassatâ et contortâ.

Hab.—Cumberland River, near the Ford and Big Creek, south of Cumberland Gap, East Tennessee, Capt. Lyon, U. S. Army.

Trypanostoma curtatum.—Testâ lævi, pyramidatâ, luteolâ, crassâ; spirâ obtusâ; suturis irregulariter impressis; anfractibus instar septenis, planulatis,

ultimo impresso; aperturâ rhombicâ, intus albidâ; labro acuto, expanso, valdè sinuoso; columellâ incrassatâ, inflectâ et valdè contortâ.

Hab.—Powell's River, near Cumberland Gap, East Tennessee, Capt. Lyon, U. S. Army.

Amnicola Currieriana.—Testâ lævi, suborbiculari, tenui, luteo-corneâ; spirâ depressâ; suturis impressis; anfractibus quaternis, supernè geniculatâ; aperturâ subconstrictâ, semi-lunatâ, intus diaphanâ; labro acuto, expanso, retrorso; columellâ incrassatâ, latâ et impressâ.

Hab.—Huntsville, Alabama, W. H. DeCamp, M. D.

Paludina Milesii.—Testâ lævi, subpyramidatâ, subcrassâ, imperforatâ; spirâ exsertâ; suturis valdè impressis; anfractibus senis, subinflatis; aperturâ parvi-usculâ, subovatâ; labro acuto, parum sinuoso; columellâ supernè et infernè parum incrassatâ.

Hab.—Branch Lake, Antrim County, Michigan, M. Miles.

June 2d.

The President, Mr. Lea, in the Chair.

Twenty-three members present.

Mr. Vaux announced the death, on the 26th of May, of Mr. John McCanless, and on the 29th, of Dr. John Y. Clark, late members; and Mr. Lesley announced the death of Prof. C. G. C. Reinhardt, of Leyden, late a correspondent.

The following was presented for publication:

Descriptions of two new species of Spermophilus. By Robert Kennicott.

June 9th.

The President, Mr. Lea, in the Chair.

Nineteen members present.

Mr. Cassin announced the death, on the 8th inst., of Edward Harris, of Moorestown, N. J., aged 64, late a member.

Dr. Slack exhibited a living specimen of Capromys pilorides, from Cuba.

The following was presented for publication:

Does the Moon influence the temperature of the Earth's atmosphere? By James Lewis, M. D.

June 16th.

The President, Mr. Lea, in the Chair.

Fifteen members present.

The following were presented for publication:

Descriptions of eleven new species of Exotic Unionidæ, and descriptions of twenty-four species of Unionidæ of the United States. By Isaac Lea.

June 23*d*.

The President, Mr. LEA, in the Chair.

Eighteen members present.

The following were presented for publication:

Additions to a Catalogue of Stars which have changed their colors. By Jacob Ennis.

Descriptive enumeration of a collection of Fishes from the western coast of Central America. By Theodore Gill.

Enumeration of the Fish described and figured by Parra, scientifically named by Felipe Poey. Translated and edited by J. C. Brevoort.

Descriptions des Poissons nouvelles ou peu connues. Par M. Felipe Poey.

June 30*th*.

The President, Mr. LEA, in the Chair.

Twelve members present.

The Committee on Proceedings presented the published No. for April and May, 1863.

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

Descriptions of four new species of SPERMOPHILUS, in the collections of the Smithsonian Institution.

BY ROBERT KENNICOTT.

SPERMOPHILUS MOLLIS.

Length about 6·50 inches, vertebræ of tail 1·70 inches; tail to end of hairs 2·60 inches. Form rather stout, with the head small and the muzzle short and compressed. Ears rudimentary, the auricle only about one-twentieth of an inch high, and scarcely distinguishable in dried specimens. Feet rather large, with the claws very weak, much compressed and considerably curved. Tail much flattened, the central hairs above and below short and closely appressed, the outer ones longer and distended laterally. The hair clothing the body is remarkably fine and soft. The upper parts are finely variegated silvery-gray, light yellowish-brown, and black; these colors intimately and uniformly mixed throughout, without any indication of spots whatever. Under parts silvery-gray, with a slight wash of dirty creamy yellow. Tail above yellowish-brown, slightly mixed with black, with a distinct and prominent border and tip of white; beneath reddish-brown within the white border.

Though very different in coloration, this species is nearly related to *S. townsendii* and the Asiatic *S. guttatus*.

Camp Floyd and Rocky Mountains, Utah, C. Drexler and C. S. McCarthy.

SPERMOPHILUS OBSOLETUS.

Length of head and body about 6 inches; vertebræ of tail one-third as long; tail with hairs usually less than one-half as long. Form that of *Sp. spilosoma*, except that the head is much narrower, the nose longer and less pointed, and the tail shorter. Ears very small; auricle scarcely one-tenth of an inch in height. Upper parts dull sandy-gray, slightly grizzled with white and with indications posteriorly of indistinct light spots, the black posterior borders of which form prominent transverse black spots; the light spots more distinct

and prominent in the young, the black borders most so in the adult. No indication of a longitudinal arrangement into lines of the spots. Crown nearly of the ground-color of the back; stripe under the eye tinged with reddish-brown, and the edges of ears and top of nose light reddish-brown in strong contrast with the other parts. Under parts generally dirty whitish, sometimes tinged with light sandy-brown. Tail above near its base, the color of the back, largely mixed with black posteriorly, and bordered and tipped with whitish; no distinct subterminal bar of black. The superior and lateral hairs with a single annulation of black. The under surface light reddish-brown, bordered and tipped by whitish, and with an indistinct subterminal border of black, mostly concealed by the overlaying unannulated hairs of the under side of the tail.

Closely related to *S. spilosoma* of which it is a northern representative. Is, however, readily distinguishable by the different coloration and much narrower skull.

Nabraska, Dr. Suckley, Dr. Cooper, Dr. Hayden.

SPERMOPHILUS ELEGANS.

Length of head and body about 7 inches; tail with hairs less than three-sevenths as long. Body moderately slender, but stouter than in *S. richardsonii;* head narrower and more tapering, though less so than in *S. 13-lineatus.* Ears rounded, distinct, a quarter of an inch in height. Feet moderately large, with the claws elongated, slender and curved. Tail about one-fourth shorter than in *S. richardsonii*, and twice as wide, much flattened; the central hairs above and below closely appressed, those on the sides widely distended. Color above pale dusky-gray, with a slight brownish wash and indistinct dark-brown mottlings along the middle of the back, without distinct spots. Under parts grayish-white, tinged with pale yellowish-brown or pale brownish cream-color, this deepest along the middle of the belly on the buttocks and outside of thighs, and arms; the chin, throat and inside of thighs and arms nearly pure white. Tail above of the color of the back, but more tinged with yellowish-brown, and with a subterminal narrow border, and broad bar of black widely edged and tipped with whitish; beneath clear yellowish-brown,—the central hairs without dark annulations,—with an indistinct subterminal border and indistinct bar of black, broadly edged by whitish.

This species is most nearly related to *S. richardsonii.*

Fort Bridger, Utah, C. Drexler.

SPERMOPHILUS ARMATUS.

Length 7½ to 8 inches, vertebræ of tail a little over 2 inches; tail with hairs about two-fifths the length of head and body. Form stout, as much so as in *S. franklinii;* head broad, ears large and distinct as in *S. franklinii*, the auricle one-third of an inch in height. Feet rather large, fore claws considerably arched and very strong. Tail short, but full, as bushy as in *S. franklinii*, though with shorter hairs. Hair of the back dense and soft. Color above, including crown, finely-mixed dark-gray and black, with a slight wash of dark-brown along the middle of the back; the colors uniformly and intimately mixed, and without any tendency to form spots or lines. Ears, shoulders, outside of thighs, and the buttocks ochry-brown, in strong contrast with the general color. Tail both above and below mixed gray and black,—all the hairs beings annulated,—with a subterminal border and tip of black edged externally with gray.

In its heavy body, strong claws, and rather bushy tail, this somewhat resembles *S. franklinii.* The size, coloration, etc., at once distinguish it, however, from that species.

Fort Bridger, Utah, C. Drexler.

Additions to the Catalogue of STARS which have changed their colors.*

BY JACOB ENNIS.

17. Spica. This star was described by Humboldt in 1850, as being "decidedly white." Cosmos, vol. iii. p. 181, Donati also arranges Spica among the white stars. It is now conspicuously blue, and has been observed of this color by myself and several friends since early in March. Inadvertently, in my communication of March in these Proceedings, I mentioned this star as Beta Libræ, which is in the near vicinity, but without speaking of a change of color.

18. Altair. Humboldt, in 1850, classes this star along with three others which he says "have a more or less decidedly yellow light." Donati also arranges it among the yellow stars. Altair is now, June, 1863, plainly blue.

19. Deneb, or Alpha Cygni. "Decidedly white," are the words employed by Humboldt to register this star in 1850. At present it is decidedly blue, and it has been of this color since early in May.

Vega. This star is placed in No. 9 of this Catalogue. Humboldt, in 1850, described it as bluish; Donati, in 1860, as white, on the authority of Schmidt. During February and March of this year, I often compared Vega and Capella together when they were at the same altitude in the Northern sky, and they seemed of the same tint, "a delicate pale blue." An observer in this city, in the middle of May, was very decided in saying to me that Vega was much bluer than Capella. On a reobservation of Vega, and from my recollection of Capella, I assented to this opinion freely. This star, I believed, had deepened its blue. Immediately there recurred to my mind the sentence of Kearny, about Capella, in a letter to Herschell, in 1859: "By the way, the color of Capella seems less blue than it used to be." Thus both these stars had changed their blue, though in opposite directions. On the 8th or 9th of June, I requested a friend who is not at all a star observer, to tell me of what color he regarded that star, pointing to Vega. After looking carefully a sufficient time he said it was green. I again looked myself, and was surprised to see that it appeared really green. Every night since then I have anxiously watched its appearance, and in very clear nights it seems green, but when the air is vapoury or hazy, it seems blue. I have referred it to some half a dozen individuals, and they, when the nights have been clear, have also pronounced it of a green color. Last winter, in clear moonlight nights, I ofted remarked that the green color of Sirius was obscured by the intermingling rays of the moon, reflected from the atmosphere. Now also Vega scarcely appears green by moonlight. There is reason to think that this change in the color of stars from blue to green is not uncommon. Humboldt says, "when forced to compare together the colors of double stars, as reported by several astronomers, it is particularly striking to observe how frequently the companion of a red or orange-colored star is reported by some observers as blue, and by others as green." Cosmos, vol. iii. p. 284, note.

Donati, in the memoir referred to in my communication of March, gives Humboldt in Cosmos, and Schmidt in Ast. Nach., as the authorities for his classification of the colors of the stars. Therefore I was misled in the dates for the color of his stars, for they cannot be as late as that of his memoir. Hence, also, the supposed discrepancy between him and Kearny disappears. Moreover, whenever he departs from the earlier of his authorities, Humboldt in 1850, I suppose it must be in favor of the latter, Schmidt. If this supposition be correct, then it would indicate that between the observations of Humboldt, and those of Schmidt, several changes of color among the stars had occurred. Humboldt gives Procyon as a yellow star, Donati as white. Humboldt

*See pages 26 and 96 of this volume.

speaks of Castor as greenish, Donati as yellow. I have not access just now to the volumes of the Ast. Nach. containing Schmidt's observations.

STARS OF THE FIRST MAGNITUDE.

Of the seventeen first magnitude stars, the changes of the colors when tabulated, stand as follows; the changes having been in the order they are here placed, the last named being their present colors. The numerals refer to the authorities below:

1. *Visible in this latitude, the 40th degree, whose colors have changed.*

Sirius: red,[1] white,[4, 6] violet-blue,[7] green.[7, 8]
Capella: red,[1, 2, 3] yellow, [4, 6] deep blue,[5] pale blue.[5, 8]
Vega: bluish,[4] white,[6] pale blue,[8] deep blue,[8] green.[8]
Procyon: yellow,[4] white,[6] blue.[8]
Altair: yellow,[4, 6] blue.[8]
Rigel: white,[6] blue.[8]
Spica: white,[4, 6] blue.[8]

2. *Visible in this latitude whose colors have not been known to change.*

Aldebaran: red.
Betelgeuze: red.
Antares: red.
Arcturus: orange yellow.

} All these along with Sirius and Pollux were denominated fiery red by the ancients.

3. *Invisible in this latitude whose colors have changed,*

Alpha Crucis: growing red.[9]
Eta Argus: orange yellow,[11] deep red.[10]

4. *Invisible in this latitude.*

Canopus.?
Alpha Eridani.?
Beta Centauri.?
Alpha Centauri. This is a double star, about the colors of the two companions Sir John Herschell says, "Both of a light ruddy or orange color, though that of the smaller is of a somewhat more sombre and brownish cast.

Authorities. — 1. The ancients; Seneca, Ptolemy, &c. 2. El Fergani. 3. Riccioli. 4. Humboldt. 5. Kearny. 6. Donati, quoting Schmidt. 7. Wilcocks. 8. Ennis. 9. Berard. 10 Gilliss. 11. Mackay. Besides these authorities for first magnitude stars, there are the elder Herschell and Struve for double stars not yet added to this catalogue, the younger Herschell and Abbott for the six stars in Kappa Crucis, Heis for Beta Ursæ Minoris, and Tycho Brahe for the star of 1575; for the green of Castor Mr. Humboldt quotes Mädler in 1849, and Miss Maria Michell describes the same star as yellow in 1863: making in all nineteen authorities, and of a character that cannot be doubted.

Among the eleven stars of the first magnitude visible in this latitude, seven, according to these evidences, have undergone changes of color, and some of them more changes than one. Among the six stars of the first magnitude in the southern hemisphere, not visible here, two have changed their colors, and of the remainder I can say nothing. And nearly all these changes have been sudden, transpiring in short periods. Moreover, none of the eleven first magnitude stars visible here are white,—all are either red, yellow, green, or blue. I look with a great deal of surprise on this tabular statement. Why has it not been made long ago? Probably, in great part, because changes in the colors of stars could not be accounted for by any prevailing scientific theory. It has been rationally assumed that the stars are similar in constitution to the sun, and the sun has been encircled with a theory which affords not the least

clue to any changes of color. This theory is most singularly complicated and unfortunate. It surrounds the sun, said to be dark, with an apparatus consisting of five distinct atmospheric envelopes, all regularly arranged one above the other: first, a transparent envelope touching the opaque body of the sun; secondly, a fiery luminous envelope; thirdly, another transparent envelope; fourthly, another fiery luminous envelope; fifthly, a transparent envelope surrounding all the others. Among such a number of imaginary things, there seems to be no room to imagine how changes of color could occur. Hence the mention of a change of color in a star has been regarded as anomalous, as an inconvenient fact, having no relation to any popular theories, and no appropriate place in the ordinary systems. Hence observations on the colors, and on the changes of colors, have not been stimulated, but rather repressed by this complex theory of the sun.

Another cause for the delay in this department of Astronomy, is the difficulty of deciding on the real colors of the stars. The reason why I did not myself first notice the greenness of Vega, was because I had been accustomed to regard it as blue. I relied unknowingly more on my belief than on my vision. This is the same as when in twilight, or less often in broad day, we think we see an object very distinctly, and on a more careful view it turns out to be really something totally different in all its parts. We see partly with our judgment, and partly with our eyes, and it often happens that our judgments warp and change the impressions on the eye. The discoverer of the change of Sirius from its former white, had been so long accustomed to regard that star as of a purple or violet blue, that it was some time after I had said it was green, before he convinced himself of its green color. Then as we all had the vague idea, though entirely baseless, that a great star millions of miles in circumference could not change so soon, he thought he must have been mistaken about the violet color. And so did I; but since my recent observations of Vega, I do not think so. Sirius and Vega seem both alike to have changed quite recently and suddenly from blue to green. Hundreds of observers had seen Sirius through a telescope, and yet Clark, of Boston, was the first to notice that it had a companion, although that companion had been plainly enough in the field of view of all their telescopes. Since then, Goldschmidt, of Paris, has announced, that with a far inferior instrument, he has observed five more companions of Sirius, all shining in its near vicinity. Previous observers did not see them, although they must have received the impressions on their retinas. Direct attention was required to those special objects. In a clear night we seem to see, by an optical illusion, ten thousand stars. The whole heavens swarm with them, and all, on account of their minuteness, appear to the naked eye to shine with a white light. The milky way deepens this general impression of whiteness. Probably less than fifty stars on any night, at once, are large enough to give the impression of colors to the naked eye. Thus the great mass appearing white, we assume that all are white, and by this means, the judgment being wrong, the colors strike the retina, but are not noticed.

While the telescope is necessary to distinguish the colors of the smaller stars, I have a suspicion that the naked eye is best for stars of the first magnitude, and perhaps for the second. These can be seen sufficiently well by the unaided eye, and no delicate tints are absorbed or added, as may possibly be done by the glasses and specula of instruments. The disturbing effects of the atmosphere, of moonlight, and of artificial lights, may be avoided by repeating the observations at different times.

In connection with the fact that all the stars of the first magnitude visible in this latitude, and at least 3 of the 6 not here visible, are colored, it may be well to state my opinion, that colored stars of all magnitudes, are far more numerous than they are generally supposed, even by Astronomers. Of 600 of the brighter double stars in the great catalogue of Struve, published in 1837, more

than one half are reported as colored, either in one or in both the companions. A catalogue of 36 stars are reported in the forthcoming number of the *American Journal of Science and Art*, for July, by MARIA MITCHELL, and selected for the measurements of distances and angles of position; 30 of these are colored in both the companions, 5 were observed in weather unfavorable for observations of color, and of the remaining one nothing is said. There is a rich mine of information in observations on the colors and on the changes of colors in the stars.

Descriptive Enumeration of a collection of FISHES from the Western Coast of Central America, Presented to the Smithsonian Institution, by Capt. John M. Dow.

BY THEODORE GILL.

Captain John M. Dow having recently forwarded a small collection of Fishes and other animals to the Smithsonian Institution, attention was arrested by the interesting nature of some of the species, and it has been deemed advisable to publish descriptions of them as well as all the other new species. Only five had been previously described; twenty-two of them are new and several represent new generic types. Many of the species are closely related to West Indian species.

Family *GERROIDÆ* Bleeker.

Genus DIAPTERUS Ranz., Gill.

Eucinostomus *Baird* and *Girard*.

DIAPTERUS DOWII Gill.

The greatest height is contained $3\frac{1}{2}$ times in the extreme length; the head $4\frac{1}{4}$ times; the diameter of the eye $2\frac{3}{4}$ in the head; the snout equals 4-5ths of the eye. The profile is rectilinear and the interorbital space nearly flat, but convex above the eyes, and nearly as wide as the eye. The maxillary groove is linear and extends backwards to a vertical midways between the front of the orbit and pupil, while the scales on each side extends to the vertical from the front of the orbits. The exposed surface of the supramaxillary bones is at first triangular and thence oblong, the whole $2\frac{1}{2}$ times as long as wide.

The height of the constricted portion of the caudal peduncle equals two-thirds of its length and the diameter of the eye. The lateral line is scarcely bent behind. The second and third dorsal spines are slender, and nearly equal half the height of the body beneath; the last is little more than half as long as the first branched ray. The third anal spine is as long as the snout and longer, but more slender, than the second.

D. IX. 10. A. III. 7. C. 4. I. 8. 7. I. 3. P. 1. 14.

Scales $47\frac{5}{10}$—

The color is silvery; the spinous dorsal blackish at margin; the axilla of pectoral blackish.

Three specimens were obtained along the coast. I dedicate the species to the excellent collector, Capt. Dow.

Family *CHÆTODONTOIDÆ* (Cuv.)

Genus POMACANTHODES Gill.

POMACANTHODES ZONIPECTUS Gill. Proc. Ac. Nat. Sci. Pa., 1862, p. 244.

A single specimen in the collection, between three and four inches long, ex-

hibits a pattern of coloration analogous to that stage of the *Chætodon paru* called *Pomacanthus quinquecinctus*. The dorsal filament is rudimentary.

Family *PERCOIDÆ* (Cuv.)

Genus CENTROPOMUS Lac.

CENTROPOMUS ARMATUS Gill.

The greatest height is contained $3\frac{3}{4}$ times in the length to the *fork* of the caudal fin. The head enters $2\frac{2}{1\frac{1}{3}}$ times in the same, and twice in the length to the vertical behind dorsal and anal fins. The distance from the subopercular flap to the preoperculum equals that of the latter from the hinder nostril. The diameter of the eye nearly equals a sixth of the head's length. The dorsal spines are very robust, and the second rather exceeds half the height of the body. The second anal spine is exceedingly developed, reaches to the vertical from the base of the caudal fin, and equals the interval between the snout and hinder preopercular spines. The first dorsal, pectoral and ventral fins when depressed terminate at nearly the same vertical, and slightly in advance of the anus.

D. VIII. I. 10. A. III. 6. C. VI. 1. 8. 7. 1. IV. P. 1. 14. V. I. 5.

Scales $51\frac{7}{14}$

The color is yellowish-brown above, tinged with silvery beneath. The dorsal fins are more or less blackish; the soft rays yellowish. The other fins are also yellowish; the anal blackish between the second and third spines, and with the second reddish. The lateral line is brownish.

A very distinct species. Compared with the species of Cuba and the West Indies, most nearly the *C. ensiferus* of Poey. The single specimen described is about eleven inches long.

Genus EPINEPHELUS (Bloch) Gill.

EPINEPHELUS ANALOGUS Gill.

The height is contained $3\frac{3}{4}$ times in the total length, of which the head forms a third. The preoperculum is delicately pectinated behind, and towards the angle armed with three stronger teeth. The diameter of the eye equals a sixth of the head's length, and equals the interorbital space as well as the snout behind the intermaxillars. The third, fourth and fifth spines are equal, and contained twice in the head in front of the upper preopercular angle; the tenth is contained $2\frac{1}{2}$ times. The caudal fin enters $5\frac{1}{2}$ times in the length; the height of the dorsal $2\frac{3}{4}$ in the head; the anal is deeper; its third spine is longest, and enters $4\frac{1}{3}$ times in the head's length; the pectoral is half as long as the head; the ventral shorter, but coterminal with it. There are about 96 rows of scales inclining more or less forwards and downwards; above the lateral line in front are about fourteen longitudinal rows.

D. X. 17. A. III. 8. C. 5. 8. 7. 4. P. 1. 18. V. I. 5.

The color is purplish-gray, with numerous dark spots about as large as the pupil; those of the pectoral and caudal fins are smaller and more crowded; of the dorsal, anal and ventral, more like those of the body. The pectorals have a narrow white margin.

One specimen, nearly fourteen inches long, is in the collection.

Subfamily *RHYPTICINÆ* Gill.

Of this subfamily, three genera are now known and are represented by nine species.

1. Rhypticus saponaceus *C.* and *V.* iii. 63.
2. " arenatus *C.* and *V.* iii. 65, pl. xlv.

3. Rhypticus subbifrenatus *Gill*, Proc. A. N. S. 1861, 53.
4. " xanti *Gill*, op. c., 1862, 250.
5. " maculatus *Gill*, op. c., 1862, 251.
6. Promicropterus maculatus = R. maculatus *Holb.*, S. C., 39, pl. vi. f. 2.
7. " nigripinnis = R. nigripinnis *Gill*, Proc A. N. S. 1861, 53.
8. " decoratus *Gill*, 1863.
9. Smecticus bicolor *Val.*, Venus, *Poissons*, p. 307 (pl. ii. f. 2.)

Genus PROMICROPTERUS Gill.

This genus is distinguished from *Rhypticus* by the presence of only two dorsal spines.

PROMICROPTERUS DECORATUS Gill.

The greatest height of the body is rather less than a quarter of the total length; the head, inclusive of the membranous prolongation of the operculum, forms a third of the length to the base of caudal, while the latter equals the area of the head behind the eye. The diameter of the eye is contained $5\frac{1}{2}$ times in the head's length, and equals the snout. The interorbital region is convex and equals half the eye's diameter. The height of the caudal peduncle equals the interval between the chin (front of the lower jaw) and eye, and the length that between preorbital and eye. The band of palatine teeth is quite broad. The dorsal and anal fins extend backwards as far as the base of caudal; the pectoral equals the distance of the opercular spine from the eye, and is twice as long as the ventral.

D. II. 26. A. 16.

The color is brownish, irregularly maculated with white spots about as large as the pupil, and generally with a blackish centre; the spots are sometimes confluent, and most numerous on the side of the body and the opercula.

This species is closely related to *P. nigripinnis*, but differs slightly in proportions and color, and the greater width of the palatine bands of teeth.

A single specimen, eight inches long, is in the collection.

Family *SCIÆNOIDÆ* (Cuv.) Günther.

Genus BAIRDIELLA Gill, 1861.

BAIRDIELLA ARMATA Gill.

The height equals a fourth of the total length, of which the head forms a fourth. The caudal fin equals the head behind the front margin of the eye. The diameter of the eye enters $4\frac{1}{3}$ times in the head's length, somewhat exceeds the interorbital area, which is scarcely convex, and equals the snout. The fourth dorsal spine is longest and nearly equals half the head's length; all are stout and robust. The second dorsal commences nearly above the 20th scale of lateral line, or tip of pectoral. The second anal spine is very strong, longer than the first ray and nearly equals the interval between the front of orbit and opercular flap; the soft fin behind is incurved. The pectoral equals the interval between the middle of the pupil, and the opercular flap and the ventral, that between the front of the pupil and the same.

D. X. 1. 23. A. II. 8. C. II. 1. 8. 7. 1. II. P. I. 1. 15. V. I. 5.

Scales $51\frac{7\ 4}{10\ 4}$

The color is hoary above, silvery below; the fins yellowish; the vertical, especially the first dorsal, clouded with darker.

One specimen, about eight inches long: notwithstanding the development of the anal spine and form of the fin, it appears to be a true *Bairdiella*.

Genus OPHIOSCION Gill.

This genus is distinguished from *Bairdiella*, by the form of the head, which

is oblong, constricted at the nape, thick and tumid, and with a high projecting tumid snout. The mouth is small and entirely inferior, the periphery semi-oval, and the supramaxillary almost entirely concealed. The preoperculum is armed with small spines radiating from the angle, and with none directed vertically downwards.

From *Rhinoscion*, it is additionally distinguished by the large scales.

A more distinct idea of the physiognomy of the genus may be obtained, if it is stated that I was immediately reminded on seeing it of the Siluroid genus *Bagrichthys* of Bleeker.

Ophioscion typicus Gill.

The height equals a quarter of the total length. The head enters rather more than $4\frac{1}{2}$ times in the same. The caudal equals the interval between the posterior nostril and opercular flap (?) and is rhomboid. The snout equals the diameter of the eye, and enters $4\frac{1}{2}$ times in the head's length; the interorbital region is little convex, and is held $3\frac{1}{2}$ times in the same. The supramaxillary bone scarcely extends to the vertical from the centre of the eye, and when retracted, only the inferior projection of the angle is visible. The third dorsal spine is the longest, and equals half the distance between the snout and the middle of the base of the pectoral. The second anal spine is very robust, but not longer than the third dorsal; the margin of the fin behind is convex. The pectoral fin equals the interval between the snout and the upper angle of the preoperculum; the ventral is somewhat longer, the outer branch of the first ray being prolonged.

D. X. I. 23. A. II. 7. C. IV. 1. 8. 7. 1. III. P. I. 1. 14. V. I. 5.

Scales $49\frac{5}{10}$—

The lateral line is subangulated at about the twentieth scale and above the great anal spine.

The color is greenish-gray above, yellowish-silvery below. The fins are yellowish; the unpaired one more or less clouded with grayish.

One specimen, eight inches long, is in the collection.

Genus AMBLYSCION Gill.

This genus differs from *Larimus* by the nearly rectilinear profile, slightly depressed between the eyes, the almost or quite vertical cleft of the mouth, and the uniserial teeth of the jaws. The symphysis of the upper jaw is edentulous and emarginated; the lower jaw is deeper at the symphysis. The other external characters are those of *Larimus*.

Amblyscion argenteus Gill.

The greatest height enters $3\frac{3}{4}$ times in the total length; the head equal the height. The caudal enters $6\frac{1}{2}$ times in the same. The snout is rather less than the eye; the latter enters 5 times in the length of the head. The interorbital area equals the eye's diameter. The height of the caudal peduncle is a half greater than the eye. The pectoral fins extend to the vertical from the third articulated ray of the second dorsal. The anal fin begins under the twentieth and ends under the sixteenth rays of the second dorsal.

D. X. I. 29. A. II. 6. C. II. 1. 8. 7. 1. I. P. 1. 14. V. I. 5.

The color is silvery, hoary above.

One specimen, about thirteen inches long.

Family *CARANGOIDÆ*.

Genus CARANX (Comm.) Gill.

Gnathanodon *Bleeker.*

CARANX PANAMENSIS Gill.

The height scarcely exceeds a third of the total length. The head enters $4\frac{1}{3}$ times in the same. The diameter of the eye, within the membrane, equals a fifth of the head's length and half of the snout. The jaws are even; the supramaxillar extends to the vertical from the front of the pupil. The second dorsal spine is longest, and scarcely exceeds a third of the head's length. The pectoral is rather longer than the head, and extends to the vertical of the sixth or seventh anal ray. The ventral enters $2\frac{1}{2}$ times in the head.

D. VII. I. 19. A. II. I. 16. P. I. 1. 19. V. I. 5.

Plates l. l. 18.

The color is silvery, with six moderately broad brown bands, between which intervene six narrower ones. The first passes over the eye. In the adult they are obsolete. The fins are yellowish; the pectoral with a black axillar spot.

One specimen nearly ten inches long was sent; another is in a former collection of Capt. Dow. The species is extremely nearly allied to the *C. speciosus* Lac., of the Eastern Seas.

Genus CARANGOIDES Bleeker.

CARANGOIDES DORSALIS Gill.

The body is angulated at the origin of the second dorsal and anal fins, where the height equals a half of the length to the fork of the caudal. The eye's diameter enters $3\frac{1}{2}$ times in the length of the head, and the snout $2\frac{2}{3}$ times. The supramaxillary reaches to the vertical from the front of the pupil. The height of the suborbitar, above the middle of the cleft of the mouth, equals about a quarter of the head's length. The first articulated rays of the second dorsal and anal fins are exceedingly long, equalling the interval between the snout and the root of the caudal. The pectoral fin reaches to the root of the second dorsal. The ventral equals the snout.

D. VII. (?) I. 18. A. II. I. 15. P. I. 1. 16. V. I. 5.

Plates 44 p. m.

The color is silvery, steel-blue above. The fins are yellowish; the dorsal clouded with black between the last rays.

Two specimens.

Genus CARANGUS (Girard) Gill.

Caranx *Bleeker.*

CARANGUS MARGINATUS Gill.

The height enters about 3 times in the length to the fork of the caudal, and $3\frac{1}{2}$ times in the total; the head forms a fourth of the length. The lower jaw is even with the profile. The supramaxillar terminates at the vertical from between the pupil and hinder border of orbit. The eye has a thin membranous eyelid behind, extending nearly to the pupil; the diameter enters $3\frac{2}{3}$ times in the head's length and equals the snout. The breast is scaly. The pectoral is longer than the head. The ventral extends half way to the interval between its base, and the first soft anal ray. The lateral line is bent under the seventh ray of the second dorsal, and thence armed with moderate shields.

D. VIII. I. 19. A. II. I. 15. P. I. 1. 18. V. I. 5.

Plates 29.

The color above is greenish-yellow, and below silvery-yellow. There is a black scapular spot, and the second dorsal and caudal are margined with black. The other fins are yellowish.

One specimen, about ten inches long, was received.

Genus OLIGOPLITES Gill.

OLIGOPLITES INORNATUS Gill.

The height enters $4\frac{2}{3}$ times in the total length; the length of the head $5\frac{2}{3}$

times. The upper maxillary reaches nearly to the vertical from the hinder margin of the orbit; the *intermaxillary* enters $2\frac{1}{3}$ times in the head's length. The snout is a little longer than the diameter of the eye; the latter equals a quarter of the head's length. The infraorbital bones do not extend to the preoperculum; the one above the maxillary bones is wider than the one above itself and as wide as that behind the eye. The opercular apparatus is vertical in front of the pectoral and for an equal space above. The preoperculum is nearly vertical and its angle obliquely rounded. The width of the operculum and suboperculum in front of the lower axilla of the pectoral equals the diameter of the eye and the interval between suboperculum and axil. The pectoral equals the interval between its axis and the hinder border of the pupil; the ventral is rather shorter but its end almost or quite reaches to the anus.

D. V. I. 20. (= 9 + 11.) A. II. I. 20. (= 12 + 8.) C. 5. 1. 8. 7. 1. 4 P. 2. 14. V. I. 5.

The color is uniform, tinged with blue above.

One adult specimen is in the collection. It is very closely related to the *O. occidentalis*, (*Chorinemus occidentalis* C. & V.) of the Caribbean Sea but the intermaxillar is shorter, the suboperculum wider and more convex below, the opercular apparatus more truncated behind, and the anus and anal fin placed farther forwards.

The Western fishes referred to the genus *Chorinemus* by Cuvier and Valenciennes do not appear to be congeneric with the Eastern and African species, but rather constitute a peculiar genus distinguished by the fewer (4—5) dorsal spines. The names of *Scomberoides* Lac., *Orcynus* Raf., *Chorinemus* Cuv. and *Porthmeus* C. et V., (young) have been applied primarily or wholly to the extra-American species and cannot be retained for the American type. The *Chorinemus occidentalis*, C., *guaribira* C. et V., *C. saliens* C. et V. and *C. palometa* Cuv. et Val., are the known species.

Family *EXOCŒTOIDÆ* Bon.

Genus EXOCŒTUS Art.

EXOCŒTUS DOWII Gill.

The greatest height is contained $5\frac{1}{2}$ times in the length to the fork of the caudal, while the head forms little more than a fifth of the same length. The width of the forehead equals $\frac{2}{3}$ of the head's length; the diameter of the eye a third. The scale in the middle of the forehead is transversely oblong and the distance between its sides and the orbits about half as great as its width. The four granulated areas in front are of small size; the one behind larger and with a smaller one on each adjoining lateral scale. The preoperculum is rectangular. The pectoral fin extends to the base of the caudal; the ventral fin is inserted nearly midways between the operculum and base of caudal and extends about as far as the last anal ray bent backwards.

D. 12. A. 12. C. 4. 1. 6. 8. 1. 6.

Scales $50\frac{9}{2}$—

The dorsal commences over the twenty-eighth scale from the scapular region and ends over the thirty-ninth.

The pectoral fins are fuliginous, with light inferior border continued on the lower rays. The ventrals are fuliginous, except on the base, inner ray and distal margin. The caudal also fuliginous. The dorsal and anal are colorless.

One specimen nearly thirteen inches long is in the collection.

Dedicated to the naturalist-collector, Captain Dow.

EXOCŒTUS ALBIDACTYLUS Gill.

The greatest height is contained nearly 6 times in the length to the fork of

the caudal. The head enters $4\frac{1}{2}$ times in the length. The width of the forehead exceeds a third of the head's length, while the diameter of the eye is less than a third. The scale in the centre of the forehead is nearly square and nearly equal to the distance between its sides and the orbits. The four granulated areas in front are of considerable extent and behind the area is transverse and confluent. The preoperculum is slightly produced at its angle. The pectoral fin extends nearly to the base of the caudal; the ventral is inserted midways between the operculum and the axilla of the anal fin, and extends to about the middle of the base of the latter.

D. 14. A. 10. P. 16.
9
Scales 45—
2

The dorsal commences over the twenty-fifth scale from the scapular region and ends over the thirty-eighth.

The color of the pectoral fins is deep blue, with the uppermost branch of each ray white. The ventral is immaculate, except at the axil and a faint spot about its centre. The caudal is deep blue. The dorsal is also blue between its fifth or sixth and last rays; the anal immaculate.

One specimen eleven inches long is in the collection.

Family *MULLOIDÆ*.

Genus UPENEUS (Cuv.) Bleeker.

UPENEUS GRANDISQUAMIS Gill.

The greatest height is contained 4 times in the length to the end of the median caudal rays, and $4\frac{1}{2}$ times in the total. The head equals the height, and is itself longer than high; the profile in front of the eyes rapidly declines downwards, and is nearly rectilinear. The diameter of the eye enters $3\frac{1}{2}$ times in the head's length, and the height of the preorbitar $2\frac{3}{4}$ times. The supramaxillar ends at the vertical from the front of the eye. The teeth in *front* of the upper jaw are biserial; below uniserial. The first dorsal fin is highest at the third spine, and there equals the head in front of the preopercular margin; the first is exceedingly short, and the second and fourth nearly equal and little shorter than the third; all the spines are very slender towards the ends. The distance of the second from the first dorsal enters $1\frac{2}{3}$ times in the base of the former and in that interval are three scales; its length is less than that of the first. The ventral equals the distance of the hinder margin of the orbit from the snout.

The tubes of the lateral line have slender branches diverging from them, generally directed obliquely upwards. The larger scales have six radiating striæ.

1 1
D. VIII. I. 7–. A. I. 5–. C. V. I. 7. 6. I. IV. P. I. 1. 14. V. I. 5.
1 1

Scales 29 (+ 2); transverse line $\frac{1}{2}$ 2 | 1 | 5.

The color is light greenish-brown above, with an indistinct silvery spot at the centre of each scale. Below the lateral line, especially between it and the anal fin, the color is rose. The dorsal fins covered with spots of the color of the back. The others are immaculate.

Two specimens, the longest of which is seven inches and a half long, are in the collection.

Family *POLYNEMATOIDÆ* Bleeker.

Genus TRICHIDION (Klein).

TRICHIDION OPERCULARIS Gill.

The greatest height equals a fourth of the length to the fork of the caudal

fin, and more than a fifth of the extreme, while the head enters 4½ times in the latter. The outline from the dorsal to the snout is nearly rectilinear and little declined. The distance of the anal from the outer axil of the ventral equals that of the posterior nostril from the margin of operculum. The first dorsal, when bent backwards, rests on the fourth scale, in front of the second. The second commences nearly above the twentieth scale of the lateral line. The pectoral is as long as the head behind the pupil. There are eight pectoral filaments, the longest of which extends rather beyond the front of the second dorsal.

D. VIII. 1. 12. A. II. 13. P. I. 1. 13.

$$\text{Scales } 69\text{—}70\text{—}\frac{8}{14}$$

The color is greenish-brown above and yellowish-green below. The operculum is blackish. The first dorsal and the pectorals, except below, are also blackish, as is likewise the margin of the caudal. The anal is tinged with orange.

A single specimen, eleven inches long, is in the collection.

TRICHIDION APPROXIMANS Gill ex. L. and B.

One specimen.

Family *MUGILOIDÆ.*

Genus MUGIL (Linn).

From this genus, I would exclude the *Mugil proboscideus* of Günther and the *M. corsula* of H. Buchanan. The former is the type of a genus which may be called *Chænomugil*, and distinguished by the longitudinal cleft of the mouth, the narrow and pointed lower jaw and the thick and angular upper lip. Two species are known to me. To the *Mugil corsula* can be given the new generic designation of *Rhinomugil corsula;* it is distinguished by the projecting rounded snout and the lateral position of the nostrils.

MUGIL GUENTHERII Gill.

The height enters 5½ times in the total length; the head 5 times; the caudal 4½, and its median rays 7⅔. The interorbital space and snout are little convex transversely; the eye has a posterior membrane covering the iris and hind part of pupil, and an anterior covering the iris; the diameter equals a fifth of the head's length, and is less than the snout. The lips are rather thin. A deep groove is in front of the vomer. The upper labial teeth are very conspicuous. The snout, which is longer than the eye, does not project beyond the mouth. The preorbital is narrowed and obliquely rounded behind, leaving a narrow line of the maxillary exposed. The dorsal fins are nearly equal in height, and contained twice in the head's length; the second as long as high; the origin of the first is nearer the snout than the base of the caudal fin, and above the twelfth scale; the second above the twenty-fourth scale of the lateral line. The pectoral fin is contained 1½ times in the length of the head and extends to the eleventh scale of the lateral line. The tip of the ventral is half way between its base and the anus. The anal is longer and higher than the second dorsal and longer than high; it commences in advance of the second dorsal. All the fins are scaleless.

D. IV. 1. 8. A. III. 9.

Scales l. l. 38. Longitudinal rows 13.

The base of the pectoral is blackish. One specimen about ten inches long.

To Dr. Günther we are indebted for the better elucidation of the numerous species of *Mugil.*

Family *BATRACHOIDÆ* Sw.

Genus BATRACHOIDES Lac.

The family of Batrachoids is capable of the following division :

A. Dorsal spines three ; opercular spines two.
1. Body naked. Palatal teeth uniserial..... Batrachus.
2. Body naked. Palatal teeth villiform..... Halophryne*
3. Body scaly. Palatal teeth uniserial..... Batrachoides.†

B. Dorsal with two spines ; operculum with one.
1. Canine teeth none..... Thalassophryne.
2. Canine teeth on vomer..... Porichthys.

Batrachoides pacifici Gill.

Batrachus pacifici *Günther*, iii. 173.

One specimen is in the collection, and differs from those described by Günther in the uniform coloration and the larger number of rays. (D. III. 27. A. 23.)

Family *GOBIOIDÆ* (Cuv.)

Genus DORMITATOR Gill.

Dormitator microphthalmus Gill.

The greatest height is contained $3\frac{2}{3}$ times in the total length and equals the length of the head. The eye is small,—the diameter equalling only a quarter of the interorbital area, and little more than an eighth of the head's length. The maxillary ceases in front of the vertical of the eye. There are three preopercular pores. The caudal is little longer than the interval between the front of the orbit and the opercular lobe. The dorsal bent backwards reaches to the base of the caudal. The pectoral is little shorter than the caudal. There are thirteen rows of scales between the origins of the second dorsal and anal fins.

D. VII. I. 8. A. I. 9. P. 1. 15.

Scales of lateral line 33.

The color is blackish, with light spots at the junctions of the scales, especially on the caudal portion. On the shoulder is a diffused black spot. A black band extends from the eye to the angle of the mouth. The dorsal fins are transversely spotted with darker, and the others clouded, the pectorals above being clear.

A single specimen, nearly a foot long, is in the collection.

The *Eleotris latifrons* of Richardson, from the Pacific, is referred, after autopsy, to *Dormitator maculatus*, (*Eleotris maculata* Günther ex Bloch) by Günther, which has only "nine or ten series of scales between the origin of the second dorsal and the anal," the diameter of the eye "not quite one-third of the interorbital space," and a less elevated body.

Genus LEPTARIUS Gill.

This new generic type is established for a representative of the *Arii* of Bleeker, having six fleshy barbels, the band of teeth on the palate, behind the maxillary band, quadripartite; the head granulated and without lateral fontanelles, the teeth of the dorsal spine before and behind directed downwards; with five branchiostegal rays, a *slender body*, and a *very slender caudal peduncle*, the *anal fin* rather low and *oblong*, the *thin, adipose fin extending behind the anal*, and the *fins little developed*.

This genus is closely related to *Hexanematichthys* (Bleeker), but is distinguished by the characters italicized in the foregoing diagnosis.

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* *Type*, Halophryne Diemensis = Batrachoides Diemensis *Les.*
† Batrachoides Surinamesis ex *Bloch.*

Among the *Arii*, with six barbels, there are apparently, thirteen generic types,—*Galeichthys* Val., *Hexanematichthys* Bleeker, *Leptarius* Gill, *Guiritinga* Bleeker, *Cephalocassis* Bleeker, *Hemiarius* Bleeker, *Ariopsis* Gill, *Notarius* Gill, (=Arius *Bleeker*, 1862, nec 1858), *Netuma* Bleeker, *Ariodes* M. T., *Sciades* M. T., *Arius* Val., Bleeker, 1859 (Pseudarius *Bleeker*, 1862,) and *Genidens* Cast.

Bleeker, in his first systematic revision of the Siluroids, restricted the name *Arius* to the genus of which the *Arius arius* Val. is the type, and, although it might have been advisable to have retained it for the first group, as he subsequently did, it must now be preserved with the limits assigned in 1859. His genus *Arius*, of 1862, comprises two distinct types, one with the buckler oblong, represented by the *Arius grandicassis*, which may be called *Notarius*, and the other with the buckler transverse, already named *Ariopsis*.

LEPTARIUS DOWII Gill.

Extreme length ($5\frac{3}{4}$ inches)	100
Body.—Greatest height	10
Height at ventrals	8
Height of tail behind anal fin	$5\frac{1}{2}$
Least height of tail	5
Length of tail	17
Head.—Greatest length	19
Distance from snout to nape	
Greatest width	$13\frac{1}{2}$
Width of interorbital area	$5\frac{1}{2}$
Length of snout	6
Length of maxillary barbels	30
Length of outer chin barbels	12
Length of inner chin barbels	10
Orbit.—Diameter	$3\frac{1}{2}$
Dorsal.—Distance from snout	25
Length of spine	$7\frac{1}{2}$
Greatest height	$7+x$.
Length of base	7
Anal.—Distant from snout	55
Length	13
Height at longest ray	$7\frac{1}{2}$
Caudal.—Length	13
Length of middle rays	6
Pectoral.—Length	$11\frac{1}{2}$
Length of spine	10
Ventral.—Distance from snout	42
Length	7

Genus SCIADES Müll. and Troschel.

SCIADES TROSCHELII Gill.

The greatest height is contained about $4\frac{1}{2}$ times in the length to the base of the caudal fin, and $5\frac{1}{2}$ times in the total. The caudal peduncle, behind the anal, equals the interval between the snout and the eye, and its least height that between the centre of the anterior nostril and eye. The head in front and on the sides is smooth, and a smooth, oblong triangular area extends nearly to the vertical from the upper angle of the preoperculum; a triangular area on each side is incurved externally to the narrow anterior extremity, and covered with white pisiform granulations. The dorsal buckler is a pentagon, with a semi-circular excavation behind and with its surface rugose. The head enters three times in the length before the end of the anal fin and more than four times in the total; its width equals the interval between the snout and upper angle of preoperculum, and the interocular area equals half the head's length.

The eye is elliptical, and its diameter is contained $6\frac{1}{2}$ times in the head's length. The distance of the posterior nostril from it equals a diameter. The maxillary barbels extend to about the middle of the pectoral; the outer mental to its base, and the inner mental are two-thirds as long as the outer.

There are three villiform patches on the palate which are almost contiguous, and together describe arch in front; the median patch is small, rather transverse and widest towards the front; the outer are oblong, subtriangular. The band of the upper jaw is nearly uniform and quite wide; the lower, interrupted at the symphysis, is nearly half as wide as the upper, and is narrowed towards its ends.

The dorsal spine enters $1\frac{1}{2}$ times in the head's length, has in front, first, minute teeth pointed downwards, and then a row of small pisiform tubercles; teeth pointed downwards on its hinder border. The first ray is little higher than the spine. The anal commences at a distance from the snout $3\frac{2}{3}$ times as great as that from the base of the caudal fin; its length enters $6\frac{2}{3}$ in the length, exclusive of the caudal, and when bent back, it reaches to the supernumerary caudal rays; the greatest height nearly equals the length. The pectoral fins extend rather beyond the base of the dorsal and exceed a fifth of the length, exclusive of the caudal; the spine equals that of the dorsal. The ventrals are inserted midways between the base of the pectoral spines and the axil of the anal, and extend to the origin of the anal.

D. I. 7. A. 16. C. 11. I. 6. 7. I. 11.

The fins are almost blackish.

A single specimen is in the collection.

Genus AELURICHTHYS B. and G.

Pimelodus *Bleeker*, nec Cuv. et al ex Lac.

Aelurichthys panamensis Gill.

The greatest height is contained 5 times in the length to the base of the caudal fin, and $6\frac{1}{2}$ times in the total. The height of the caudal peduncle equals half the interorbital area, and is half its length behind the anal fin. The smooth head enters 4 times in the length to the middle of the central caudal rays, and nearly 5 times in the total.

The width of the head enters $1\frac{1}{3}$ times in its length, and the width of the interorbital area $1\frac{2}{3}$. The eye is elliptical; its diameter equals a fourth of the head's length, and the distance from the anterior nostril is equal to it. The maxillary barbels extend backwards nearly to the anus, and the mental to the bases of the pectoral fins.

The dorsal buckler is rather longer than wide, with its anterior margin concealed and its lateral and posterior very conspicuous, rounded towards the posterior angles and emarginated behind; the sides slope and form a rectangle, and the surface is filled with deep oblong pits.

The anal fin is situated midways between, or scarcely in advance of, the central point between the bases of the pectoral and caudal fins; it is oblong and equals or nearly equals the width of the head. The pectoral filaments extend about to the middle of the anal fin; the ventrals are inserted midways between the lower jaw and base of caudal, and extend backwards to the anus, entering $2\frac{1}{2}$ times in the head's length.

D. I. 7. A. 27. C. 13. I. 7. 6. I. 12. P. I. 13. V. 6.

The color above is plumbeous; the pectorals thickly dotted with black on their inner faces; and the anal less so.

One specimen eight inches long is in the collection.

Family *LEPIDOSTEOIDÆ*.

Genus ATRACTOSTEUS Girard ex Raf.

Atractosteus tropicus Gill.

The height is contained $8\frac{1}{2}$ times in the extreme length, and is nearly a half

greater than the thickness. The head forms scarcely less than a fourth of the same. The snout equals the distance of the margin of the fifth scale of the lateral line from the front of the eye. The breadth of the head at the occiput equals half the length of the snout; at the eyes, little more than a third and behind the nostrils, it enters $5\frac{1}{2}$ times in the same. The diameter of the eye equals a sixth of the snout's length. The operculum is nearly as high as long, subangulated behind, convex below at the anterior third, and thence advancing upwards towards the posterior margin. The ventral fins are nearer the snout than the margin of the caudal, the latter extending about a third of its own length beyond.

D. (III.) $\frac{7.}{8}$ A. (III.) 8. C. (IX$_2$) 6+6. (IX$_2$) P. (I.) 13. V. (III.) 6.

Scales $\frac{52+}{12}$ (at ventral between median dorsal and abdominal rows.)

The scales are nearly smooth; in front deeper than long and obliquely convex below; behind oblong rhombic and with rectilinear margins. Forty-five scales precede the dorsal fin; the ventrals are behind the sixteenth oblique row; the anal behind the thirty-fifth and ending with the forty-first. Seven rows of scales intervene between the lateral line and ventral fins.

The color is glaucous above the lateral line and yellowish beneath. A spot in front of the caudal above the lateral line; others are on the forty-fifth and forty-seventh rows of scales below the lateral line, and obscure ones on the base of the caudal.

This species is, for American Zoologists and Palæontologists, the most interesting fish of Capt. Dow's fine collection. It is by far the most southern continental representative of the family that has been yet made known,—the "*Lepisosteus robolo*" of Lacépède, founded on the *Esox chilensis* of Molina, not belonging to this family. The only other species hitherto discovered beyond the boundaries of the United States or Northern Mexico is a Cuban species of the same genus, the *Atractosteus tristœchus*, *Esox tristœchus* of Schneider and *Lepidosteus manjuari* of Poey. The present species is distinguished by the form of the operculum, its proportions and the large size of the scales. A single specimen, nearly sixteen inches long, was obtained by Capt. Dow.

Family *TRYGONOIDÆ*.

Genus UROTRYGON Gill.

Urotrygon mundus Gill.

The *disk* is orbicular with a slight linguiform projection in front and with the pectoral fins behind broadly rounded. The distance of the snout from the hinder margin of the pectorals equals the width of the disk. The tail (behind the anus) is rather longer than the body (in front). The spine is inserted behind the middle of the tail, and is about as long as the distance between the snout and the nostrils. The ventral fins extend outwards, the rectilinear anterior margin tending little backwards, and the external margins are on a line with and complete the outline of the disk. The posterior margin in the male is nearly rectilinear, while in the female it is slightly convex, especially towards the inner angles. The upper velum is very sinuous and fimbriated. The *teeth* are pointed and pyramidal. The *spiracles* are oval, interrupted at the intero-anterior angle by the eyes, and the margins are entire and well defined. The *skin* is beset with numerous small stelliform tubercles, larger on the dorsal region. The *color* is a uniform dark-brown above.

Two small specimens, male and female, are in the collection.

The present species would, by many zoologists, be referred to the genus *Urolophus* of Müller and Henle, but it would appear that it and the *U. torpedinus*

should be separated from that genus and referred to a distinct one, distinguished by the rounded and not angular outline, the longer tail and posterior insertion of the spine, and especially the acute teeth.

Enumeration of the Fish described and figured by Parra, scientifically named by Felipe Poey.

Antonio Parra was born in Portugal, and I believe resided in Havana for a long time, where he was probably naturalized, for he dedicates his work to the King of Spain, and sent the objects he described to the Museum of Natural History of Madrid. He printed in this last city, in 1799, at the printing office of the Viuda de Ibarra, a pamphlet in 8vo. entitled: *Discurso sobre los medios de connaturalizar y propagar en Espana los Cedros de la Habana y otros arboles, asi de construccion como de Maderas curiosas y frutales.* At page 21 is "an account of the different trees of the Island of Cuba, which contains 267 species and 20 Palms," and at page 30 a "notice of some kinds of hard wood which are in the Island, their colors, the localities where they are found and their uses." The author describes them in popular terms only.

The first important work of Parra is the one printed at Havana in 1787, at the printing office of the Capitania General, in square 8vo., under the title *Descripcion de diferentes piezas de Historia Natural, las mas del ramo maritimo, representadas en setenta y cinco laminas.* This number of plates includes two of ornamental stands and two of a negro suffering from a greatly developed hernia. In some copies there is a second title, engraved, containing the words *Peces y Crustaceos de la Isla de Cuba.** It contains 40 plates of Fishes, representing 71 species, of which 3 belong to Florida; there are 17 plates of crustacea, the rest representing turtles, zoophytes and minerals.

The figures were probably drawn by the son of Antonio Parra; he also engraved them and colored some of the copies. The edition has long since been exhausted. One copy is in the library of the Economic Society, another is owned by M. Domingo de Arozarena, and M. Leonardo del Monte has the third. All the objects figured, including the negro with the hernia, are deposited in the Museum of Madrid, and have been of help in settling some serious doubts by the assistance of the present director of the Museum, M. Mariano de la Paz Graells.†

The work cites no authors, contains no classification, no scientific terms, and the names are all popular ones. It is easily seen that Parra has studied no books except the great book of nature; by his own natural gifts he has succeeded in describing and figuring objects as correctly as his cotemporaries, and even surpasses Bloch in the exactness of his figures. Cuvier says, "it is one of the most useful works in the study of the fishes of the Gulf of Mexico, not only on account of the text, but also on account of the very exact figures representing them."

Parra does not omit describing the teeth of the jaws, the asperities of the scales, nor even the spinous rays of the dorsal fin and the furrow in which they can be hidden. He dwells more especially on the number and the peculiarities of the fins, and he cannot be reproached for omitting in his descriptions details that are shown in his figures. He observed, very properly, that the colors are less important than the rest of the organism, for he only treats of them last. To be sure he neglects the palatine teeth, the spines of the operculum, the denticulations of the preoperculum, the exact number of the spinous and soft rays, but this is not surprising in one who preceded Cuvier and Valenciennes,

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*My copy has an engraved frontispiece representing two tritons raising a net full of fish near a rock, with a label inscribed, *Labore, et Constantia.*—J. C. Brevoort.

† In the United States, copies are known to be in the libraries of the Boston Society of Natural History, in the late Dr. DeKay's, in the Astor Library and in my own,—this last a colored one.—J.C.B.

and who probably was not acquainted with the works of Artedi, Linnæus or Gronovius.

He often gives the size of the fish, but he may be found fault with for having sometimes given measurements of parts without that of the whole.

Whatever may be the merits and defects of Parra, it is not the less true that his work has become indispensable, for Bloch has established several species on the sole authority of his figures, and because Cuvier and Valenciennes have often quoted him, as well as M. Hollard.

I propose to put scientific names to Parra's figures, with some necessary remarks, and shall use the labors of my predecessors while often correcting them. The chief writers who have cited Parra, are Bloch, Cornide, Cuvier, Valenciennes, Guichenot, Müller and Henle, and Hollard.

Bloch has named almost all the figures of Parra in his posthumous work entitled *Systema Ichthyologiæ iconibus* CX.. *illustratum*, published by Schneider in 1801. When the species appeared to be a new one he kept the vulgar name of the author, even in doubtful cases. He was often mistaken, and was corrected by Cuvier and Valenciennes, to whom he repeatedly serves as a guide.

Cornide, author of an *Ensayo de una historia de los Peces y otras producciones marinas de la costa de Galicia*, 1788, names Parra's fish in a confidential letter addressed to *M. Casimiro Gomez Ortega*, Director of the Botanical Garden in Madrid; which letter is published in the first volume of his work, printed at Paris in 1818, under the title of *Coleccion de Papeles cientificos, historicos y politicos sobre la isla de Cuba.* Cornide was not very successful in his determinations; he constantly refers the American species to others he had observed in Europe. He recognized but four Linnæan species, and these the most striking ones, namely, a *Fistularia*, a *Diodon*, and two *Squali.* He did not even notice the *Balistes vetula*, nor the *Lophius vespertilio.* He often gives only the genus, and not always correctly, so far as to confound a *Chaetodon* with a *Sparus* and a *Serranus* with a *Labrus.*

Cuvier, in his notes to the Règne Animal, second edition, tom. 2, 1817, has named several of Parra's figures, and also in his *Histoire générale et particulière des Poissons*, which began to appear in 1828, with the assistance of Valenciennes, and stopped in 1849 with the 22d volume, at the end of the Abdominal Malacopterygians. The opinion of these celebrated ichthyolgists is of the greatest weight, from their known scientific attainments, and because they had at their disposal almost all the fish described in the work of Parra; some having been given by myself, together with my own drawings; the others by M. Desmarest, who received them from M. Fournier.

M. Guichenot undertook the part relating to Fish in the *Histoire politique, physique et naturelle* of M. Ramon de la Sagra. He has not omitted to quote Parra's work, but he seems to have taken small pains while doing so, and to have relied on Cuvier and Valenciennes, whose correct determinations and whose errors he reproduces. In the families not treated of by these naturalists he generally determines his species from Hollard.

M. Saco has corrected the nomenclature of Cornide, with the assistance of M. Guichenot's work, and without studying Parra's work. This distinguished author, having no knowledge of Ichthyology, and not being familiar with what is known as Synonymy, has not made the best use of his model.

Parra is quoted in Müller and Henle's work on Plagiostomes, in the Monograph of the Gymnodonts of Hollard, in the Fishes of New York, by Dr. DeKay, and by Dr. Bleeker in several of his articles.

As for myself, it will be seen on examination how much I have added to and corrected all that has hitherto been done. The opinion of authors has not been given without care. I have compared their descriptions with those of Parra, and with actual specimens, having the advantage of working in Havana, and of knowing the fish by their popular names. My authority is therefore of some weight, even where my names are the same as those given by others; in

which case it may be looked upon as a confirmation rather than a repetition. If I did not believe it to be so, I should not have taken the pains to write.

The reader must understand that my object is not to give a complete synonymy of the fishes figured by Parra, but to name them in the best possible manner, quoting authors who have quoted Parra, so that each may get his due. Thus I shall quote Bloch, Cuvier, Valenciennes, and Hollard. As for M. Guichenot, I shall often quote him, because he had Parra's work under his eyes, and in some cases his opinion is well founded. If not quoted in all cases, it is for reasons above given. It is useless to notice Cornide and M. Saco.

In my nomenclature, I practise the aphorism which I thus enunciate: *nomen auctoris ad speciem perpetuam refertur nec ad variabile genus.*

Nomenclature.

N. B.—The first figure after the name refers to the page of Parra's work, the second to the plate, and the third to the figure.

1. Pescador. (1, 1.) *Antennarius ocellatus* Bl.
Named by Bloch 142, *Lophius histrio* L., var. *ocellatus*, upon the simple inspection of Parra's figure. By Val. 12, 419, *Chironectes ocellatus*. By Guich. *Chir. biocellatus*, C. V., erroneously.

2. Serrana. (2, 2, sup.) *Eques lanceolatus* L.
Quoted by Cuvier, 5, 165, *Eq. baltcatus*, as a synonym of *Chætodon lanceolatus*, L. Linnæus has the priority. The vulgar name is now *Vaqueta*, which is, however, but little used, and is also applied to the next species.

3. Serrana. (2, 2, inf.) *Eques punctatus* Bl.
Quoted by Bloch, 106, upon the inspection of Parra's figure. He confounds it, like Parra, with the preceding species.

4. Perro colorado. (3, 3, 1.) *Cossyphus Bodianus* Bl.
Quoted by Bloch, 329, *Lutianus Perro*, being the same which he had named in his large work, tab. 255, *Lutjanus Verres*, and tab. 223, *Bodianus Bodianus*. Quoted by Val., 13, 103.

5. Perro. (4, 3, 2.) *Lachnolaimus caninus* Cuv.
Quoted by Cuvier, Règne An. 257, *Lachnolaimus*.

6. Diablo. (5, 4.) *Malthe vespertilio* L.
Quoted by Val., 12, 440.

7. Guativere. (7, 5, 1.) *Serranus Guativere* Val.
Quoted by Bloch, 336, *Bodianus Guativere*, which he confounds with the next species of Val., 2, 283.

8. Guativere. (8, 5, 2.) *Serranus Outalibi* Val.
Quoted by Val., 2, 381.

9. Chirivita. (9, 6, 1.) *Chætodon Paru* Bl.
Bloch, 217, confounds it with the next species. *Pomacanthus Paru* Cuv., 7, 205. Following Mr. Gill, I suppress the genus *Pomacanthus* of Cuvier, and adopt *Sarothrodus* Gill, instead of *Chætodon* Cuv. The popular name is now *Chirivica*.

10. Chirivita. (10, 6, 2.) *Chætodon aureus* Bl.
Pomacanthus aureus Cuv., 7, 202.

11. Isabelita. (11, 7, 1.) *Holacanthus ciliaris* L.
Quoted by Bloch, 335, under the name of *Chætodon Parræ;* but it is the same as the *C. ciliaris* L., to which Cuv. 7, 154, refers it.

12. Catalineta. (12, 7, 2,) *Holacanthus tricolor* Bl.
Chætodon tricolor, Bl. 219; Cuv. 7, 162.

13. Bajonado. (13, 8, 1). *Pagellus Bajonado* Bl.
Cited by Bl., 284, *Sparus Bajonado*, doubtful species ; by Guich. *P. Penna*, C.V., with doubt.

14. Caxis. (14, 8, 2.) *Mesoprion caxis* Bl.
Cited by Bl. 284, *Sparus caxis*, doubtful species. It is the *Mesoprion griseus* Cuv. 2, 469. The letter *x* being pronouneed *j* in the old Spanish, it should be written now *Cajis*, or rather *Caji*.

15. Cochino. (15, 9). *Balistes vetula* L.
Cited by Bl. 470; by Holl. and Guich.

16. Sobaco. (17, 10). *Balistes macrops* Poey.
Cited by Bl., 465, as a variety of *Bal. maculatus* L., and by Holl. under the name of *Balistes longissimus* Holl. Mr. Guichenot, who has followed for the *Balistides* the unpublished monograph of Holl., ealls it also *B. longissimus* without naming the author. It appears that he has forgotten to name Hollard; he refers, also, the species to Bl. Syst. 464, n. 2, whieh is the *B. hispidus* L., probably by a misprint, instead of, n. 3, cited by Blkr., *Balistes maculatus* L. See Poey, Mem. 2, 326.

17. Galafate. (18, 11, 1). *Balistes piceus* Poey, (1).
Cited *B. ringens* L. by Bl., 473, Holl., Guich. Blkr. The vulgar name *Galafate* is a corruption of *Calafate*, which means Calfateur, (*calker*).

18. Cucoyo. (19, 11, 2). *Balistes cicatricosus* Poey, (2).
Cited by Bl., 475, *B. Brasiliensis* var.; by Holl. and Guieh., *B. calolepis* Holl. Later Hollard referred it to his *B. lineo-punctatus*, whieh appears to be the same as the *B. curassavicus* Gm. It is now written *Cocuyo*.

19. Catalufa. (20, 12, 1). *Priacanthus catalufa* Poey, (3.)
Cited by Bl., 304, *Anthias macrophthalmus*, a speeies of the East Indies ; by Cuv., 397, *Priac. macrophthalmus*, the male of whieh, says he, is the *Pr. cepedianus* Desm., in whieh he is mistaken.

20. Quiebra-acha. (21, 12, 2). *Chorinemus quiebra* Cuv.
Cited by Cuv. 8, 396; by Bl., 25, *Scomber aculeatus* var.

21. Matejuelo blanco. (22, 13, 1). *Malacanthus Plumieri* Bl.
Cited by Bl. *Sparus oblongus*, p. 283; but it is the same as his *Coryphæna Plumieri*, p. 298; cited by Cuv., R. An. p. 264; by Val. 13, 319.

22. Matejuelo colorado. (23, 13, 2). *Holocentrum Matejuelo* Bl.
Cited by Bl., 206, *Amphiprion Matejuelo*, doubtful speeies; by Cuv., 3, 186, *Hol. longipinne*, a species very nearly allied, if it is not the same; in any case Bloch has the priority.

23. Morcielago. (25, 14). *Dactylopterus volitans* L.
Cited by Cuv., 4, 117. This vulgar name, so written, is a corruption of the Spanish word *Murcielago* (Bat.)

24. Volador. (28, 15). *Exocœtus mesogaster* Bl.
Cited by Bl. 430; by Val. 19, 120.

25. Bonaci cardenal. (29, 16, 1). *Serranus cardinalis* Val.
Cited by Val. 2, 379. Bl., 77, has confounded, under the name of *Johnius guttatus*, this speeies with the following; his name should not be preserved, beeause it had been previously employed by Linnæus.

26. Bonaci arara. (30, 16, 2). *Serranus Bonaci* Poey.
Cited by Poey, Mem. 2, 129, 352, instead of *Ser. Arara* Val. 2, 377 ; *Johnius guttatus* var.

27. Chapin ♀. (31, 17, 1). *Ostracion*, (4)
Cited by Bl., 499, *Ostr. bicaudalis* L., as well as by Holl.

28. Chapin ♂. (31, 17, 2,). *Ostracion*, (4 *a.*)
Cited erroneously by Bl., 499, 583, *Ostr. quadricornis* L., as well as by Guich

29. Rascacio. (34, 18, 1). *Scorpæna Rascacio* Poey.
Bl., 192, refers it to *Sc. Scrofa* L.; and Cuv. to *Sc. Bufo*, 4, 306. See Poey Mem. 2, 169.

30. Lagarto. (36, 18, 2). *Synodus.*
Cited *Saurus myops* by Val., 22, 485; referred to the *Salmo fœtens* L. by Bl. 404. It is to me a new or very doubtful species.

31. Tamboril. (37, 19,). *Tetrodon lævigatus* L.
Cited by Bl., 503, *Tetr. lagocephalus* L.; by Guich., *Tetraodon Lisse*, and in the synonymy *Tetr. lævigatus* L.

32. Rabirrubia. (42, 20, 1). *Mesoprion chrysurus* Bl.
Cited by Bl., 309, *Anthias Rabirrubia;* but it is the same as his *Sparus chrysurus* Bl., Ichth. tab. 262. Cited by Cuv. 2, 459. It should be written in Spanish *Rabirubia.*

33. Rabirrubia de lo alto. (43, 20, 2). *Serranus creolus* Val.
Cited by Val. 2, 265. Bl. makes a doubtful variety of the preceding species, Syst. p. 309.

34. Rabirrubia genizara. (44, 21, 1). *Clepticus genizarra* Val.
Cited by Val., 13, 260. The word *Genízaro*, in the feminine *genízara*, means Janissary. Has M. Val. correctly latinized it?

35. Barbero. (45, 21, 2). *Acanthurus phlebotomus* C. V.
Cited by C. V., 10, 176. Bl. refers it to his *Ac. cœruleus*, p. 214.

36. Lija trompa. (46, 22, 21, 1). *Alutera picturata* Poey (5).
Cited erroneously *Monacanthus longirostris* by Holl., as well as by Guich.

37. Lija barbuda. (48, 22, 2). *Alutera Güntheriana* Poey (6).
Cited with doubt by Bl., 462, as *Balistes monoceros* L. Cited by Guich. *Monacanthus anginosus* Holl.; and by Holl. *Aluterus anginosus.* It is by a misprint that Guich. has written *Lija trompa.*

38. Lija colorada. (49, 22, 23). *Monacanthus Parraianus* Poey (7).
Cited *Mon. macrocerus* Holl. by Guichenot.

39. Cherna. (50, 24, 1). *Serranus striatus* Bl.
Cited by Bl., 310, with doubt, *Anthias Cherna*, but it is the same as his *Anth. striatus.* Cited by Cuv. R. An. 141, and by Val. 2, 288.

40. Jabonsillo. (51, 24, 2). *Rhypticus saponaceus* Bl.
Cited by Bl., 310, *Anthias saponaceus.* Cited by Cuv. 3, 60, *Rypticus.*

41. Caballerote. (52, 25, 1). *Mesoprion caballerote* Bl. (8).
Cited by Bl., 310, *Anthias caballerote?* Cuv., 2, 465, *Mesoprion cynodon* Cuv., a distinct species.

42. Jocu. (53, 25, 2). *Mesoprion Jocu* Bl.
Cited by Bl., 410, *Anthias Jocu;* by Cuv. 2, 466.

43. Guacamaya. (54, 26). *Scarus Guacamaia* Cuv.
Cited by Cuv., R. An. 265. Val. describes under this name another species, which I name in my Mem., 2, 393, *Sc. Pleianus.*

44. Loro. (57, 27, 1). *Scarus cœruleus* Bl.
Cited by Bl., 288, *Sc. Loro*, which is the same as the following; by Val. 14 186.

45. Trompa. (57, 27, 2). *Scarus cœruleus* Bl.
Cited by Val. 14, 186; the preceding species.

46. Vieja. (58, 28, 1). *Scarus superbus* Poey.
Cited erroneously by Bl., 289, *Sc. vetula* L., as well as by Cuv., R. An. 266, and by Val., 14, 193. See Poey, Mem. 2, 218.

47. Vieja. (58, 28, 2). *Scarus Abildgaardii* Bl.
Cited by Bl., 289, *Sc. coccineus*, doubtful species, but it is the same which he names *Sc. Abildgaardii* in his Ichthyologie, pl. 259.

48. Vieja. (59, 28, 3). *Scarus Chloris* Bl.
Cited by Bl., 289, doubtful species; by Cuv. R. An. 266; by Val., 14, 203, *Sc. vivens.*

49. Vieja. (59, 28, 4). *Scarus flavescens* Bl.
Cited by Bl., 290, doubtful species; by Val., 14, 289, *Callyodon flavescens.* It is not a *Calliodon.*

50. Erizo. (60, 29, 1). *Diodon Atinga* L.
Cited by Guich *Diodon Hystrix* L.

51. Guanabana. (62, 29, 3). *Diodon.*
Cited by Bl., 512, *D. Hystrix* L., variety; by Guich., *D. orbicularis* Bl.

52. Trompetero. (63, 30, 1). *Solenostomus tabacarius* L.
Cited by Bl., 114, *Fistularia tabacaria* L., as well as by Guich.

53. Trompetero colorado. (65, 30, 2). *Aulostoma coloratum* M. and Tr.
Cited by Guich. *Aul. Chinense* Lac. (*Fistularia Chinensis* L.)

54. Raro. (66, 30, 3). *Muræna fasciata* Thunb.
Cited by Bl., 529, *Gymnothorax fasciatus*, which he refers to *Mur. fasciata* Thunb.

55. Bagre. (68, 31, 1). *Galeichthys marinus* Mitch.
Bl., 378, cites it, referring it to the *Silurus Bagrus* L. Cited by Val., 15, 33, *Gal. Parræ.* The species is from Florida, as Parra indicates.

56. Brotula. (70, 31, 2). *Brotula barbata* Bl.
Cited by Bl., 152, *Enchelyopus barbatus;* by Cuv. R. An. 335.

57. Cornuda. (71, 32). *Sphyrna Zygæna* L.
Cited by M. H.; by Guich. *Zyg. malleus* Val.; by Blkr. *Zyg. malleus* Risso.

58. Pez de espada. (75, 33). *Pristis antiquorum* Lath.
Cited by Bl., 352, *Pr. granulosa*, on the simple inspection of Parra; cited by M. H. The popular name is *Pez-Sierra.* Its saw has 27 pairs of teeth, in which respect it is rather related to the *Pristis cuspidata* Latham.

59. Galludo. (84, 34, 1). *Acanthias.*
Cited by Guich. *Acanthias vulgaris* Risso.

60. Gata. (86, 34, 2). *Ginglymostoma cirratum* Gm.
Cited by Bl., 134, *Squalus punctatus*, which is the same; by M. H. and Guich.

61. Macabi. (88, 35, 1). *Conorhynchus macrophthalmus* Lac.
Cited by Cuv., R. An. 325, under the genus *Butirinus;* by Val., 19, 339, *Albula Parræ.* It is probable that the two species are identical.

62. Picuda. (90, 35, 2). *Sphyræna Picuda* Poey. (9).
Cited by Bl., 110, under the name of *Sp. Picuda*, which he gives as a variety of *Esox sphyræna* L. Cuv., 3, 340, refers it erroneously to the *Sph. Becuna* Lac.

63. Cabrilla. (93, 36, 1). *Serranus lunulatus*, Bl.
Cited by Bl., 329, under the genus *Lutianus*; by Val. 2, 379.

64. Pegador. (94, 36, 2). *Echeneis Guaican* Poey.
Cited by Guich. *Ech. naucrates* L. See Poey, Mem. 2, 248.

65. Doncella. (95, 37, 1). *Julis pazatus* Val.
Cited *Julis crotaphus* by Cuv., R. an. 258; *Julis Principis* by Val., 13, 402; *Julis patatus* Val., by Guichenot.

66. Innominado. (96, 37, 2). *Ophisurus Havanensis* Bl.
Cited by Bl., 491, under the genus *Muræna.*

67. Rubio volador. (98, 38). *Prionotus punctatus* Bl.
Bloch, 13, doubtfully refers it to the *Trigla Carolinensis* L. Cited by Cuv. 4, 93.

68. Guavina. (105, 39, 1). *Philypnus dormitator* Bl.
Cited erroneously by Val., 12, 223, under the name of *Eleotris Guavina.*

69. Esturion. (106, 39, 2). *Acipenser.*
This species is from Florida; I leave its identification to the Ichthyologists of the United States.

70. Chifis. (109, 40, 1). *Lepidosteus osseus* L.
Cited by Bl. in the genus *Esox*, p. 392; cited by Guich. *Lep. gavialis* Lac. This species is from Florida.

71. Manjuari. (111, 40, 2). *Lepidosteus tristœchus* Bl.
Cited by Bl., 395, under the genus *Esox;* by Guich. *Lep. spatula* Lac.; by Poey, Mem., *Lep. Manjuari.*

Descriptions des POISSONS nouvelles ou peu connues.

PAR M. FELIPE POEY.

1. Balistes piceus Poey.

Longueur totale de l'individu décrit, 250 millimètres; hauteur sur la pointe pelvienne, 140. La tête depuis l'ouverture branchiale, est contenue 4 fois daus la longueur du poisson, sans compter les pointes de la caudale. Le profil antérieur est courbe. L'œil est haut, à un diamètre du front. Le sillon préorbitaire est du diamètre de l'œil, lequel est contenu 4 fois dans la distance qui sépare l'orbite de l'extrémité du museau. L'ouverture des narines est près de l'œil. La bouche est petite, et porte en haut et en bas de chaque côté 4 dents incisives, dont la 1e plus large, surtout à la mâchoire inférieure où les dents ont un talon en arrière; on voit à la mâchoire supérieure, en dedans, 3 dents latérales. L'épine dorsale fait un peu plus que le quart de la hauteur du tronc; elle est forte, le sommet tronqué et hérissé d'épines, granuleuse sur le devant; le sillon de sa membrane a beaucoup d'étendue. La 2e dorsale est un peu plus en avant que la moitié du corps; l'anale est sous son 9e rayon, et finit au-dessous de la dorsale ou un peu plus en arrière: ces deux nageoires ont à-peu-près la même hauteur, qui répond en avant à la hauteur de l'épine dorsale; ellcs diminuent en arrière environ de moitié. La caudale est taillée carrément, et porte aux deux extrémités une pointe qui forme la moitié de la nageoire nue. La pectorale est arrondie, très courte; sa hauteur égale deux fois sa longueur. Les deux premiers rayons *des nageoires moyennes* sont plus courts, et ne paraissent pas branchus. D. 3, 34; A. 32; P. 17; C. 12. Les squames forment des rhombes plus hauts que larges, et deviennent horizontales à la région pelvienne: elles sont couvertes de nombreux petit grains; mais le limbe restant nu, permet de compter nettement les séries; les granulations des joues sont un peu plus relevées, et les squames conservent à-peu-près la même forme, un peu plus petites sous les yeux, très petitcs le long des nageoires moyennes, ainsi que sur la base de la caudale et de la pectorale. L'écusson huméral se compose de trois grandes squames radiées. La pointe pelvienne est médiocre et âpre; les bords de la membrane abdominale qui

remonte vers l'anus, offre des rugosités bien prononcées. La partie postérieure du trone, au-dessus de l'anale est parcourue par sept ou neuf lignes longitudinales, formées par des tubercules saillants, au milieu de chaque squame; le tubereule antérieur developpé en pointe épineuse tournée en avant. La couleur est noire comme du poix; mais la base des nageoires moyennes porte une bandelette d'un bleu clair, n'ayant pas deux millimètres de large. Quand l'animal est vivant, la couleur générale est d'un bleu de Prusse foncé. Les lignes dénudées de granulations, qui séparent entre elles les squames de la partie antérieure du tronc portent à l'angle obtus une tache plus foncée, qui produit des traits longitudinaux, lesquels disparaissent presque entièrement sur la peau desséchée. Vulgo *Calafate*, mal nommé par d'autres *Galafate*.

La figure de Bloch, pl. 152, présente sous le nom de *Balistes ringens* L. l'épine dorsale d'un tiers plus longue, et pointue, très dentée sur son bord antérieur; la bande blanchâtre de la base des nageoires moyennes est très large: il le fait venir de la Chine. Le Dr. Bleeker, *Enumeratio Piscium*, le dit de Sumatra. M. Hollard, Ann. des Se. Nat., 4e série, tome i. p. 317, le donne comme appartenant à l'Amérique du Sud, à l'Oeéan Pacifique et aux Antilles; mais sa description ne peut pas être rapportée à l'espèce de la Havane. En effet, il dit que l'on remarque sur les joues, supérieurement, quatre rangées horizontales de squames subrectangulaires; que les squames du tronc portent des tubercules disposés en séries antéro-postérieures, avec tendance à un développement prédominant des tubereules de la série médiane; que la couleur est uniformément foncée, avec des nuances plus obscures au dos. Ce caractère des joues n'existe pas dans mon espèce; les tubercules n'existent que sur les lignes assez courtes qui partent du tronc eaudal; il n'y a point de nuances plus obscures sur le dos. Ces différences, jointes aux considérations que fournit la loi de distribution géographique, portent à admettre deux espèces voisines: celle des Ind. Orient. et celle des Antilles. Je regrette de n'avoir par sous les yeux le Mus. Ad. Fr. de Linné, pour savoir laquelle de ces deux espèces a été décrite par l'illustre auteur Suédois: si c'est l'espèce actuelle, je propose le nom actuel pour l'espèce Indienne.

2. Balistes cicatricosus Poey.

J'ai décrit cette espèce dans mes Mémoires, tome 2, p. 327. J'ajoute ici que l'épine dorsale est épineuse à sa troncature.

Tout en rapportant le *Cucuyo* de Parra à son *Balistes lineo-punctatus*, M. Hollard, Ann. des Sc. Nat., 4e série, tome 4, p. 25, laisse entrevoir que ee pourrait être le *B. Curassavicus* Gm.; nom sous lequel M. Kaup a réuni, dit-il, quatre espèces distinctes, savoir les *Balistes gutturosus*, *calolepis*, *lineo-punctatus*, *et elongatus*. Voilà bien des doutes survenus depuis la publication de mes Mémoires: je ne me trouve pas en état de les résoudre. Heureux ceux qui peuvent visiter les collections du Musée Britaunique, de Paris, de Berlin! Ils poursuivent la science sur une route aisée. L'espèce de Gmelin a été établie sur la déseription de Gronovius, *Zooph. Balistes* 196; dont les nombres sont D. 2, 27; A. 26 (j'ai de ma part D. 2, 31; A. 28); deux on trois séries d'écailles longitudinales sur la joue. Si les espèces nommées ei-dessus sont distinctes, à laquelle faut-il rapporter le *B. Curassavicus* de Gmelin? En atteudant je compare avee le *B. lineo-punctatus* de Hollard, *loco citato*, tome 1er p. 65, (et renferme entre parenthèses les différences que présente mon *B. cicatricosus*.) Ile de Bourbon.

Aux joues trois séries disjointes de squames quadrilatères (deux); des lignes noires longitudinales sur le tronc, dégénérant en arrière et sur le ventre en séries de taches punctiformes (des taches punctiformes sur tout le tronc, entre les écailles, formant des points violets cerclés de blanc); D. M. 28; A. 25 (D. M. 31; A. 28); aux joues se trouvent de bas en haut trois séries en gradation de longueur, dont la supérieure s'arrête à la région sous-pectorale (cet espace est occupé par un système irrégulier de petites squames). Il est

parlé de la zone en forme de croissant qui termine la caudale, mais non pas de la bande* qui borde cette nageoire en dessus et en dessous ; ni du liseré jaune des nagcoires moyennes : l'individu bourré de M. Hollard était cependant en bon état de conservation.

3. Priacanthus catalufa, Poey.

Le mâle décrit est long de 360 mill. Sa hauteur est comprise 4 fois moins un ciuquième dans la longueur totale. La tête égale cette hauteur, si l'on mesure depuis l'extrémité de la bouche entre-ouverte. L'œil a les deux cinquièmes de la distance qui sépare l'opercule du bout supérieur du museau. Les narines sont près de l'œil, qui est assez haut ; l'ouverture postérieure est allongée, oblique, étroite proportionnellement à ce que l'on remarque dans d'autres espèces, et elliptique ; l'antérieure très petite, presque coutigue. L'intermaxillaire est étroit et court ; le maxillaire large, atteignant au compas le devant de la pupille : la mâchoire inférieure est plus avancée que l'autre. Les dents sont en velours aux deux mâchoires, au vomer et aux palatius. Le préopercule est finement denté ; il a son angle terminé eu une pointe courte et oblique. L'opercule a une pointe plate qui ne fait pas saillie. Un os de l'épaule se montre au-dessous de la ligne latérale, un autre au-dessus du trow branchial. Le 1er sous-orbitaire est dentelé. Les ouies sont bien fendues. La dorsale commence au-dessus de l'os supérieur de l'épaule ; elle s'élève graduellement en arrière, et se termine par un angle arrondi ; il en est de même pour l'anale : le premier rayon de ces deux nageoires, *vus à la loupe*, a quelques âpretés, qui ne sont pas dues aux écailles ; les autres sont lisses. La caudale est un peu échancrée, la pointe supérieure tant soit peu plus longue quc l'inférieure. La pectorale est médiocrc. La ventrale est logée dans une cavité de l'abdomen ; elle est plus avancée que la pectorale ; son rayon épineux est allongé, le 2e rayon mou est filamenteux, le dernier adhérent au trouc par une membrane ; la pointe de cette nageoire atteint au 2e rayon de l'anale. D. 10, 14 ; A. 3, 15 ; P. 19 ; V. 1, 5 ; C. 16. Les écailles ne sont pas ciliées ; mais elles out uue certaine âpreté qui est due a une relief de leur partie centrale : on eu compte environ 95 sous la ligne latérale. Celle ci remonte en arc en sortant de l'épaule, et descend ensuite insensiblement. Les écailles sont plus petites sur le dos ; la tête en porte de plus petites partout, excepté sur les lèvres ; il n'y en a pas aux nageoires. La peau et les écailles du ventre en-dessous sont très dures. La couleur est d'un rouge uniforme ; les pectorales plus pâles ; extrémité des ventrales bleuâtre ; peu ou point de traits aux nageoires. Iris rouge, pupille peu foncée. Les poissons de ce genre ont, suivant Cuvier, moins de 7 rayons aux ouïes ; j'ai vu dans une espèce voisine l'intestin à deux replis, la langue âpre, 12 cœcums, orgaues génitaux triangulaires, vertèbres 9 + 13. La base du crâne présente dans l'espèce actuelle un caractère remarquable : c'est un trou fort grand entre la grande aîle et la base du sphénoïde postérieur ; ce trou n'a pas de communication avec l'intérieur du crâne ; il ue se retrouve pas dans les autres espèces. Les plus grands individus sont d'un pied de long.

La femelle diffère du mâle en ce que son corps est un peu plus court ; ce qui paraît être du à la moindre distance qu'il y a eutre la base des ventrales et l'anus ; et c'est ce qui fait q'ayant ces nageoires plus courtes et non prolongées eu filament, elles attcignent au même point.

L'espèce la plus commune est sans doute l'*Anthias macrophthalmus* de Bloch pl. 319 (le mâle) ; qu'il dit être du Japon ; et dans son ouvrage posthume, du Tranquebar. Cuvier, considérant que l'auteur se trompe très souvent sur l'origine des poissons, le dit du Brésil, de la Martinique et de Cuba ; mais l'autorité du Dr. Bleeker prouve assez qu'il est des Indes Orientales. Lacé-

(* D'un brun rougeâtre.)

pède en fait son *Lutjan macrophthalme.* J'ignore pourquoi Bleeker a mis ce nom dans la synonymie de son *Pr. Blochii*, car Bloch a la priorité. Le grand nombre d'espèces contenues daus le genre Priacanthe, me fait croire qu'en bonne distribution géographique, les individus de la Havane ne sont pas les mêmes que ceux des Indes Orieutales. Ou pourrait même croire que ceux qui ont été décrits par Cuvier sont différents; car il décrit le crâne sans accuser le trou de sa base; sa hauteur est plus grande (le tiers de la longueur), l'œil est plus grand (près de la moitié de la tête); les rayons mous de la dorsale et de l'anale sont âpres, ce qui eu meme temps permet de supposer que le premier rayon épineux est lisse. Il dit que, selon Plée, il arrive au poids de 8 á 10 livres; on n'eu trouve jamais à la Havane du poids de deux livres.

Nous avons à Cuba deux autres espèces différentes: elles n'ont pas la base du crâne percée, les épines de la dorsale et de l'anale sont très âpres dans les deux sexes, la hauteur est le tiers de la longueur totale, l'ouverture postérieure des nariues est plus courte, plus ouverte, plus verticale, la caudale coupée carrément, l'angle du préopercule plus long et dirigé en arrière; D. 10, 13; A. 3, 14; les nageoires verticales marquées de bandes brunes. Ces deux espèces diffèrent par les couleurs: l'une a le corps rouge, c'est le *Pr. boops*, Forst., *Cepedianus*, Desm., que Cuvier a pris pour le mâle du *macrophthalmus;* l'autre a le corps couvert de grandes taches arrondies, les unes d'un rouge clair, les autres d'un brun rougeâtre, c'est le *Pr. cruentatus*, Lac. Le *Catalufa* de Parra, pl. 22, f. 1, représente une femelle, qui peut être rapportée au *Pr. boops*, et encore mieux à l'espèce que je décris.

4. Chapin; Parra. Tab. 17, fig. 1.

Cette espèce ne saurait être l' *O. bicaudale*, puisque la caudale est carrée, le tronc caudal porte une plaque antérieure sur son bord supérieure, le corps est d'une couleur uniforme, ainsi que la nageoire caudale. M. Graells m'écrit que l'exemplaire déposé au Muséum de Madrid est d'une couleur jaunâtre et sans taches; 4 plaques caudales, dont une antérieure, une autre postérieure et deux latérales, separées, vers le milieu. Parra ne signale qu'une seule plaque dans le texte et sur la figure. Est-ce que l'exemplaire de Madrid ne serait pas l'original? Je n'eu ai pas eucore trouvé un semblable.

4 *a.* Chapin, Parra. Tab. 17, fig 2.

J'attends sur cette espèce de nouveaux renseignements demandés à M. Graells. Ce savant Directeur du Musée de Madrid m'a écrit que l'exemplaire déposé a les squames bordées de noir. Ainsi l'on pourrait avec doute rapporter la figure de Parra à l' *O. quadricornis*, L. M. Graells ajoute qu'on y voit de plus des lignes onduleuses brunes; il ne dit pas où; et que les plaques caudales sont contigues au tronc, ce qui iudique peut-être qu'elles font partie du tronc; car Parra dit qu'il n'y a pas de plaques.

5. Alutera picturata, Poey.

Individu décrit, 650 mill. Corps très prolongé: sa hauteur, prise à la régiou pelvienne, est contenue 3 fois et trois quarts dans la longueur totale; dout la tête, depuis le bout de la mâchoire inférieure jusqu' à l'angle inférieure de l'ouverture branchiale, forme la 5e partie: la caudale en est le quart. Le profil de la tête forme une courbe rentrante en haut et en bas; ce qui constitue un museau aigu, qui termine par uu avaucement remarquable de la machoire inférieure, comme un menton arrondi qui dépasse de beaucoup les dents. L'ouverture branchiale est oblique; et vers le dessus de son angle supérieure s'élève l'œil, qui est haut, séparé six fois son diamètre de l'extrémité de la machoire supérieure. L'ouverture des narines est près de l'œil. L'os pelvien caché sous la peau, est courbe; il ne préseute vers la pointe aucune saillie, ni aucune aspérité dans son étendue; le fanon abdominal remonte

vers l'anus par une pente peu rapide et graduelle. La machoire supérieure porte de chaque côté trois dents incisives, qui augmentent en largeur de haut en bas; il y a en dedans deux dents plates latérales. La mâchoire inférieure en a aussi trois, l'antérieure plus large, les deux premières échancrées. Le rayon unique dont est formée la première dorsale, est situé au-dessus des deux tiers postérieur de l'orbite; il est grêle, légèrement tourné en arrière; il a la moitié de la hauteur du corps au-dessous de lui; son âpreté est imperceptible, sa membrane et son sillon très-courts. La 2e dorsale commence à une distance égale à une fois et deux tiers cette longueur, et s'étend davantage. L'anale est un peu plus longue et un peu plus en arrière; voyez ci-dessous pour la hauteur. La caudale est plus longue que haute, à bord postérieur arrondi. La pectorale est courte et ronde. Les rayons mous excepté ceux de la caudale, sont simples, plats, articulés vers leur extrémité; ceux des nageoires moyennes ont leur base logée dans deux prolongements de la peau. L'extrémité de la caudale est plus longue et plus aigue dans le jeune âge. D. 1 + 45; A. 47; C. 12; P. 14 ou 15. La peau n'offre au toucher qu'un velours très-ras: vue à la loupe, ou y distingue de petits grains, qui à un plus grand grossissement montrent une pointe épineuse. Il n'y a pas de brosse caudale, pas même dans le mâle. La couleur est d'un brun d'olive médiocrement foncé. Les nageoires sont jaunâtres, excepté la caudale qui est bleuâtre. Iris jaune. Les contours de la bouche sont roses. L'estomac est contiuu avec l'intestin, la rate est arrondie. Vertèbres 7 + 14. On écorche ce poisson pour le manger: sa chair est très blanche et succulen te.

La figure de Parra (pl. 22, f. 1, *Lija-trompa*), que je rapporte à cette espèce, a induit eu erreur M. Hollard, qui en a fait un Monacanthe. En effet, Parra lui donne uu developpement pelvien excessif. M. Graells m'a écrit que cela se voit ainsi sur l'original conservé à Madrid; mais il est possible que cet original mal bourré ait servi de módèle au dessinateur. Ce qui le prouverait, c'est que Parra lui-même, en décrivant le Monacanthe nommé par lui *Lija-colorada*, dit "que le ventrc forme un angle saillant, *en quoi il différe de la Lija-trompa*." Parra ajoute que la caudale est bcaucoup plus large que longue; c'est le seul caractère qui me déroute.

L'espèce la plus voisine est le *Balistes lævis* de Bloch, qu'il dit se trouver en Europe, Asie et Amérique: ses couleurs offrent quelques différences. Quant à la patrie, nous sommes maintenant certains que c'est un poisson de l'Archipel Indien, d'après le témoignage de l'infatigable et savant ichthyologiste Dr. P. Bleeker. M. Hollard le fait venir de l'Océanie, de Bahia et de la Caroline du Sud. La description que M. Hollard fait de l'*Alutera lævis*, dans les Ann. des Sc. Nat., 4e série, tome 4, p. 15, n'est pas d'accord avec la mienne: j'en donne ici uu extrait, et je renferme les différences entre parenthèses. "Rayons de l'anale 49 (47). La hauteur de l'épine dorsale dépasse un peu le quart de la hauteur du corps (elle dépasse le tiers et même les deux ciuquièmes). La dorsale molle et l'anale atteignent la même hauteur que l'épine (la moitié; car elle n'est pas le quart de la hauteur du corps): elles s'abaissent notablement dans leur moitié posterieure (presque pas). Long. 470 mill. caudale 150, région céphalique 120 (long. 650, caud. 170, rég. céph. 130 au moins; ce qui rend ces deux parties plus courtes)." La différence de la queue peut dépendre de l'âge, comme l'indique un individu de ma collection long de 530 mill.; mais il n'en est pas ainsi de la rég. céph. qui est de 98 mill. comprise cinq fois et demie dans la longueur totale. Ignorant la patrie de l'individu décrit par M. Hollard, et ayant égard aux travaux antérieurs du Dr. Bleeker, je laisse le nom de *A. lævis* à l'espèce de l'Archipel. Indien.

6. Alutera Guntheriana, Poey.

Individu décrit, 510 mill. Il se distingue au premier coup-d'œil par une protubérance, qui appartient plutôt au gosier qu'au menton; sa région pelvienne forme une courbe qui fait suite régulièrement à la peau de l'abdomen.

Le corps est très comprimé. La bouche est petite, le museau obtus. Sa hauteur est le tiers de la longueur totale. La tête, prise depuis l'angle interne de l'ouverture branchiale, y est comprise un peu plus de cinq fois. L'œil est séparé trois fois son diamètre de la ligne médiane dorsale, et six fois de l'extrémité du museau. La fente branchiale est très oblique, et sa moitié antérieure dévance l'orbite. Les narines ont deux ouvertures rapprochées, placées l'une devant l'autre, assez près de l'œil. D'après ce que mon dessin, de profil, permet de croire, les dents seraient comme dans l'espèce précédente. L'épine dorsale est grêle, non dentée, terminant en pointe déliée, presque droite, tournée en arrière ; son sillon est court ; sa hauteur fait les deux tiers de la hauteur du corps au-dessous d'elle, c'est presque les deux tiers de la plus grande hauteur du corps ; son point d'attache est au-dessus ou un peu en avant du bord antérieur de l'œil. La ligne du dos remonte un peu en ligne droit, dès ce point. La 2e dors. est aussi éloignée de l'épine, que celle-ci l'est du bout du museau. L'anale est presque aussi avancée, et tant soit peu plus étendue. Ces deux nageoires sont peu relevées sur le devant (une fois et trois quarts le diamètre de l'œil), et décroissent graduellement en arrière, où elles n'offrent que le tiers ou le quart de la hauteur antérieure. La pectorale est arrondie. La caudale est au moins deux fois aussi haute que longue : elle est coupée verticalement, de manière à présenter son bord postérieur sinué, c'est-à-dire, convexe au milieu, et terminée en deux pointes courtes qui avancent un peu moins que la convexité.* D. 1 + 48 ; A. 51 ; P. 14 ; C. 12. Je n'ai pas la peau sous les yeux ; mais mon dessin représente les squames formées de plusieurs grains microscopiques, qui n'ont pas été vus présentément à la loupe : ils sont doux au toucher. La couleur est plombée ; mais le gosier et le dessous du ventre sont blanchâtres. Il y a sur la nuque et le long du dos de petites taches brunes. Les flancs sont ornés de traits bien différents, tantôt circulaires, tantôt allongés. Ces traits disparaissent promptement ; c'est pourquoi Parra ne les a pas représentés dans sa *Lija-barbuda*, pl. 22, f. 1, qui est l'espèce actuelle. L'œil est doré, avec quelques ondes obscures. Les nageoires sont orangées, excepté la caudale, qui est d'une couleur de plomb bien foncée.

Ce ne saurait être l'*Aluterus anginosus* de M. Hollard, qui l'a vu en nombreux exemplaires au Musée de Paris, tous des Indes Orientales. Je ne le trouve pas cité dans l'*Enumeratio Piscium* du Dr. Bleeker. Les individus décrits par M. Hollard, Ann. des Sc. Nat., 4e série, vol. 4, p. 11, ont l'épine dorsale courte, et la caudale arrondie. D. 49 ; A. 53.

7. Monacanthus Parraianus, Poey.

C'est le *Lija-colorada*, Parra, p. 49, tab. 23. Il ne diffère du *M. stratus*, Poey (Mém., v. ii. p. 239) qu'en ce que : 1° il n'a que deux paires de grosses épines sur le tronc caudal ; 2° il n'a pas de brosse au-devant de la queue ; 3° il n'a pas le dessin en forme de selle indiqué par le nom de *stratus*. D. 13, A. 31. Ces différences appartiendraient-elles au sexe feminin ? L'individu de ma collection a de long. 330 mill. La couleur uniforme d'un brun jaunâtre, sans taches blanchâtres arrondies, le distingue du *M. macrocerus*, Holl., dont j'ai une femelle de 360 mill.

8. Mesoprion cynodon, Cuv.

Cuvier, Histoire de Poissons, vol. 2, p. 465.

Vulg. *Cubera*.

J'ai cru longtemps que le poisson nommé à la Havane *Caballerote*, répondait au jeune âge de celui qui est connu sous le nom de *Cubera ;* mais je me suis détrompé en comparant deux individus du même âge, dont je vais donner une description minutieuse. Je croyais également que la figure produite par

* La nature des rayons est comme dans l'espèce antérieure.

Parra sous le nom de *Caballerote* appartenait au *Cubera*, à cause de son museau court et du maxillaire allongé ; je l'ai même ainsi témoigné dans le *Conspectus* de mes Mémoires. J'ai changé d'opinion ; 1° parce que j'ai su de M. Graells que l'original déposé au Musée de Madrid, n'a que 380 mill. de long ; 2° parce que le nom de *Caballerote*, donné par Parra, doit être pris en considération ; 3° parce qu'on doit croire que la figure de Parra est inexacte, lorsqu'on voit la même inexactitude reproduit sur la fig. du Mésoprion *Jocu*, qui a le museau prolongé et le maxillaire court.

Individu décrit, 350 mill. Le profil de la tête n'est pas aigu ; la ligne du front est courbe. La hauteur est comprise 3 fois et 5-6 dans la longueur totale ; la tête y est 3 fois et 1-5. L'œil est haut, il fait le 16e de la longueur totale ; il est contenu 5 fois et ½ dans la tête ; et de son centre à l'extrémite de l'opercule, il y a 3 fois son diamètre. Les deux ouvertures de la narine sont aussi rapprochées entre elles que l'ouverture postérieure l'est de l'orbite ; l'ouverture antérieure plus petite que l'autre, est au tiers de la distance qui sépare l'œil du bout du museau. Ces mesures changent avec l'âge, en suivant les changements de l'œil. Le préopercule est sinueux, à cause d'une échancrure située au-dessus de son angle, qui est obtus ; sa branche montante est très finement dentelée, les denticulations de l'angle sont plus marquées. La bouche est grande, car le maxillaire pris au compas et reporté sur l'œil, atteint le milieu de la pupille ; et mesuré sur le dessin, c'est à dire avec la diminution qu'exige la perspective, il est contenu sept fois dans la longueur du poisson. Les dents sont sur deux rangées : l'externe de la mâchoire supérieure composée de chaque côte de 12 dents aiguës, écartées, la 1e médiocre, la 2e grande et forte, comme une canine, les autres petites, décroissant en longueur ; l'interne forme une bande triangulaire en velours, étroite en arrière, et finissant au milieu de la mâchoire. Les dents externes de la mâchoire inférieure commencent par une canine médiocre, vient après un espace libre pour loger la canine supérieure, puis dix dents dont les cinq premières médiocres, aigues, écartées, les dernières très petites ; en dedans il y a une bande étroite en velours, aussi courte que celle d'en haut. La 1e dorsale commence au-dessus de la pointe operculaire ; sa partie épineuse est plus étendue que l'autre ; le 3e rayon est le plus haut, le 1er n'a que la moitié de cette hauteur, le 2e garde un terme moyen ; les autres décroissent graduellement jusqu'au dernier, qui est aussi long que le précédent et se rapproche de la partie molle. Les rayons articulés sont médiocrement branchés, surtout à la dorsale. L'anale commence au-dessous du 3e rayon articulé de la dorsale ; ses rayons épineux sont d'une longueur et d'une force médiocres : ces deux nageoires sont médiocrement hautes, et se terminent en angle arrondi, la dorsale un peu plus en arrière. Les pectorales et les ventrales sont larges, à pointe peu aigue ; les pectorales font la moitié de la longueur de la tête. La caudale est taillée en croissant. D. 10, 14 ; A. 3, 8 ; P. 17 ; V. 1, 5. La ligne latérale n'a pas de courbure bien notable ; elle est surmontée en avant par l'os scapulaire, qui forme une écaillure. Les écailles sont aussi hautes que longues, très finement ciliées et ponctuées ; leur éventail commence sur les côtés et prend tout le bord radical, montrant environ 40 brins ou stries courtes ; elles sont assez grandes, et quoique je ne les ai pas comptées, je les crois égales à celles de l'espèce qui suit, 45 sur une ligne longit., 14 en travers au-dessous de la ligne latérale, 5 au-dessus. La tête n'a des écailles qu' à l'opercule, aux joues et sur une partie des tempes ; il n'y en a pas sur l'interopercule, ni au limbe du préopercule ; mon dessin n'en présente pas entre les rayons mous des nageoires moyennes ; il serait possible qu'il n'y en eut pas, d'autant plus que la partie du corps où est attachée l'anale, ne présente aucune saillie ; ce que j'aurais de la peine à expliquer par l'inexactitude du dessinateur, car ce serait avoir une trop mauvaise opinion de moi-même. Il est d'un brun un peu violet, avec des reflets dorés sur une partie de l'écaille ; nageoires vineuses, iris brun. Le crâne est comprimé, la crête occipitale

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basse, l'occipito-pariétale haute et rapprochée de la ligne moyenne ; sa base est de 68 mill. Les vertèbres sont 10 + 14, les six premières abdominales sans apophyses latérales, les quatre suivantes en portent de grandes formant l'anneau excepté sur l'autérieure. Intestin à deux replis, foie court, vésicule du fiel allongée, 5 cœcums dont deux plus longs, vessie aérienne fibreuse, résistaute. Ce poissou a bon goût ; on en prend beaucoup à Matanzas ; on en voit rarement à la Havane, parce qu'on le croit malfaisant. Il atteint le poids de 120 livres et davantage ; sa voracité est très grande. Il apparaît à Cienfuegos abondamment eu Juin, Juillet, et Août quelques jours après la nouvelle lune. On a tort de croire (Voyez mes Mém., p. 388) qu'il a uue grosse canine de plus que le *Caballerote:* il ne faut pas se laisser tromper par les dents de rechange. Schomburgh l'a trouvé à la Barbade. L'espèce décrite par Cuvier a 9 rayons mous à l'anale : elle est de St. Domiugue, et il a cru la reconnaître dans le *Caballerote* de Parra.

9. Mesoprion Caballerote, Bloch.

Anthias Caballerote, Bl. Schn., p. 310.
Caballerote, Parra, tab. 25, f. 1.
Vulg. *Caballerote.*

Je vais suivre la description antérieure, et je n'exprimerai que les différences ; les autres caractères sont les mêmes. L'individu décrit a également 350 mill. Le profil de la tête est aigu, la ligne du front presque droite. La hauteur est comprise 3 fois $\frac{3}{4}$ dans la longueur totale. L'œil n'est pas aussi haut que dans l'espèce antérieure ; il est contenu 5 fois dans la tête, et de son centre à la partie antérieure de la pupille, il y a 3 fois son diamètre. Les deux ouvertures de la narine sont plus rapprochées entre elles, que l'ouverture postérieure ne l'est de l'orbite ; l'ouverture antérieure est au milieu de la distance qui sépare l'œil de la partie postérieure de l'os intermaxillaire abstraction faite de l'apophyse montante. Le maxillaire atteint au bord postérieur de l'orbite, contenu 8 fois et demie dans la longueur du poisson. La 1er dorsale commence un peu en arrière de la pointe operculaire ; son 4e rayon est le plus grand ; le 1er n'est que le quart, le 2e les deux tiers, le 3e les $\frac{3}{4}$ (Je ne les vois pas toujours ainsi dans tous mes dessins.) Les pectorales font les 3-5 de la tête. Il y a quelques écailles sur l'interoperculaire ; il y en a entre les rayons mous de la dorsale et de l'anale, surtout à l'anale qui est attachée à une saillie arrondie du corps. La tête est rose, d'un brun rougeâtre en dessus ; le tronc est brunâtre en dessus, rougeâtre sur les flancs, ce qui est dû à la couleur centrale des écailles ; le ventre est rose. La dorsale et la caudale sont violacées ; les rayons de la dorsale molle sont rougeâtres ; les autres nageoires tirent sur le rouge. L'œil est d'un brun jaunâtre. La base du crâne a 76 mill. de long, ce qui tient au prolongement de la partie préorbitaire ; les apophyses articulaires du frontal antérieur obéissent à cette direction, et deviennent plus obliques. Je n'ai pas sous les yeux les vertèbres mais je sais que les six premièrs sont comme dans le *M. cynodon.*

Ce poisson est très commun au poids d'une ou deux livres ; son plus grand poid est de 8 livres. On voit sous le même nom des variétés qui, mieux étudiées formeraient peut-étre des espèces distinctes : les unes ont une ligne sous-orbitaire de points bleus, comme nos Mésoprions *Jocu* et *Caji;* d'autres ont les séries d'écailles sinueuses au-dessus de la ligne latérale vers la queue ; d'autres ont des bandes transverses, ce que je n'ai vu qu'une seule fois sur un poisson vivant. Les *Caji* (*Mes. griseus, flavescens, linea*) et le *Jocu* ont le museau plus prolongé.

10. Sphyræna Picuda, Poey.

J'enlève le nom spécifique à Bloch par les raisons suivantes ; 1° parce que le nom n'est pas entièrement de Bloch, puisque c'est le nom vulgaire donné par Parra ; 2° parce que Bloch n'en fait qu'une variété de l'*Esox Sphy-*

ræna, L., et c'est moi qui réellement ai nommé l'espèce; 3° parce qu'il n'est pas permis de donner des noms propres aux variétés, et l'on ne doit pas en sanctionner l'usage; 4° parce que c'est moi qui ai fait reconnaître cette espèce, en la comparant avec les *Sph. Becuna*, *Barracuda*, *Guaguanche*, *Picudilla*, dans mes Mém. sur l'Hist. Nat. de Cuba, vol. 2. Bloch n'a rien ajouté à Parra, dont il a copié la figure.

May 5.—Mr. Lea read part of a letter from T. Rupert Jones, F. R. S., Prof. of Mineralogy and Geology in the Royal Military College at Sandhurst, England, in which he informs Mr. Lea that he has been engaged many years in the examination of fossil *Estheriæ*, and was about to publish a monograph in which he recognises the species described by Mr. Lea, as *Posidonia ovata*, from Phœnixville, Pa., and those near Richmond, Va., in the "Estherian shales" (Trias) of these localities, and states that "*Estheria ovata*, Lea, is as important in the palæontology of North America as *E. minuta* is in Europe," but that its exact geological place is not defined without difficulty.

Prof. Jones also communicates to Mr. Lea, a very important observation in recognizing *Cypricardia Leidyi*, Lea, published in our Proceedings in 1855. Some specimens of this "enigmatical fossil" were found in the carboniferous strata in England, 26 years ago, and it is also almost as rare there as it is here. The specimen described by Mr. Lea was found by Dr. Leidy, and is the only one which has been found in this great mass of red shale, (Formation No. xi. of the Penn. Survey.) There was always a doubt in Mr. Lea's mind, whether this species belonged to *Cypricardia*, but in the absence of observation as to the teeth, it was impossible to decide with certainty. Professor Jones finds two varieties of the same species in the Coal Measures near Manchester and in Fifeshire, and considering that they do not belong to the genus *Cypricardia*, proposes to form them into a new genus, and in his paper to be published by the Palæontological Society, he will give diagnoses and illustrations of the American species and European varieties, under the name of *Leaia Leidyi*. That from Lancashire he calls variety *Williamsoniana*, and that from Fifeshire, as variety *Salteriana*.

July 7th.

The President, Mr. Lea, in the Chair.

Twelve members present.

July 14th.

The President, Mr. Lea, in the Chair.

Eleven members present.

July 21st.

The President, Mr. Lea, in the Chair.

Thirteen members present.

Mr. Kilvington presented to the notice of the Academy specimens of Rhus Cestricus, Darl., a plant first detected by him.

The following papers were presented for publication:

Description of a new genus of Chœrojulis from North Carolina. By Theo. Gill.

On an unnamed generic type allied to Sebastes. By Theo. Gill.

Notes on the Picidæ, with descriptions of new and little known species. By John Cassin.

Description of a new species of Unio and a Monocondylœa from Siam. By Isaac Lea.

July 28th.

Mr. Cassin in the Chair.

Nine members present.

On report of the respective committees, the following papers were ordered to be published:

Description of Eleven New Species of EXOTIC UNIONIDÆ.

BY ISAAC LEA.

Unio delicatus.—Testâ lævi, ellipticâ, subinflatâ, inæquilaterali; valvulis subtenuibus; natibus prominulis, ad apices undulatis et granulatis; epidermide stramineâ, eradiatâ; dentibus cardinalibus parvis, compressis, crenulatis, in utroque valvulo duplicibus; lateralibus sublongis, lamellatis rectisque; margaritâ albidâ et iridescente.

Hab.—River Orontes, Syria. C. M. Wheatley.

Unio Bourguignatianus.—Testâ lævi, obliquâ, inflatâ, inæquilaterali, ad latere parum planulatâ; valvulis percassis, anticè crassioribus; natibus prominentibus, tumidis; epidermide, stramineâ, eradiatâ; dentibus cardinalibus magnis, erectis, in utroque valvulo duplicibus, subcompressis, corrugatis crenulatisque; lateralibus prælongis, crassis, corrugatis subcurvisque; margaritâ albâ et valdè iridescente.

Hab.—Tigris River at Mosul, Asia Minor. C. M. Wheatley.

Unio dignatus.—Testâ lævi, valdè obliquâ, inflatâ, ad apices turmidâ, valdè inæquilaterali, ad latere parum planulatâ; valvulis percrassis, anticè crassioribus; natibus prominentibus, tumidis, incurvis, terminalibus, ad apices parum granulatis; epidermide vel luteo vel luteo-fuscâ, micante, eradiatâ; dentibus cardinalibus erectis, compressis et crenulatis; lateralibus prælongis, lamellatis subcurvisque; margaritâ argenteâ et valdè iridescente.

Hab.—River Tigris at Bagdad. C. M. Wheatley.

Unio rasus.—Testâ lævi, latâ, inflatâ, valdè inæquilaterali; valvulis crassis, anticè crassioribus; natibus prominentibus, ad apices parum undulatis; epidermide rasâ, dilutè stramineâ, eradiatâ; dentibus cardinalibus compressis, corrugatis, crenulatis, in utroque valvulo duplicibus; lateralibus prælongis, corrugatis subrectisque; margaritâ argenteâ et parum iridescente.

Hab.—Assyria. C. M. Wheatley.

Unio Syriacus.—Testâ sulcatâ, subellipticâ, inflatâ, valdè inæquilaterali; valvulis subtenuibus, anticè incrassatis; natibus prominentibus, tumidis; epidermide tenebroso-olivaceâ, eradiatâ; dentibus cardinalibus parvis, acuminatis, subcompressis, in utroque valvulo duplicibus; lateralibus parviusculis, lamellatis subcurvisque; margaritâ albidâ et iridescente.

Hab.—River Orontes, Syria. C. M. Wheatley.

Unio Damascensis.—Testâ lævi, quadratâ, compressâ, valdè inæquilaterali; valvulis crassiusculis, anticè crassioribus; natibus prominulis, ad apices crebrè et obliquè undulatis; epidermide luteo-viridi et obsoletè radiatâ; dentibus cardinalibus parviusculis, compressis, crenulatis, in utroque valvulo-duplicibus; lateralibus longis, lamellatis rectisque; margaritâ argenteâ et iridescente.

Hab.—River Barado, Damascus, Asia Minor. C. M. Wheatley.

Unio Orontesensis.—Testâ lævi, quadratâ, inflatâ, valdè inæquilaterali; valvulis parum crassis, anticè crassioribus; natibus prominulis, ad apices crebrè et minutè undulatis; epidermide rufo-fuscâ, obsoletè radiatâ; dentibus cardinalibus parviusculis, compressis, acuminatis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subrectisque; margaritâ vel albidâ vel dilutè purpureâ et valdè iridescente.

Hab.—River Orontes, Syria. C. M. Wheatley.

Unio Mosulensis.—Testâ lævi, ellipticâ, subinflatâ, valdè inæquilaterali; valvulis crassiusculis, anticè crassioribus; natibus prominulis, ad apices minutè undulatis; epidermide stramineâ, micante, eradiatâ; dentibus cardinalibus parviusculis, corrugatis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subrectisque; margaritâ albâ et iridescente.

Hab.—River Tigris at Mosul. C. M. Wheatley.

Unio tripartitus.—Testâ sulcatâ, subellipticâ, subinflatâ, subæquilaterali; valvulis crassis, anticè crassioribus; natibus prominentibus, solidis, parum undulatis; epidermide virido-luteâ, obsoletè radiatâ, micante; dentibus cardinalibus crassis, valdè corrugatis, in utroque valvulo duplicibus; lateralibus curvatis, percrassis, corrugatis et in valvulo sinistro tripartitibus; margaritâ dilutè salmoniâ et elegantissimè iridescente.

Hab.—Jillingee River, India. Dr. Burrough.

Monocondylœa compressa.—Testâ lævi, transversâ, valdè inæquilaterali, valdè compressâ, ad latere planulatâ, posticè angulatâ, anticè rotundatâ; valvulis pertenuibus; natibus vix prominentibus, ad apices undulatis;.epidermide micante, olivaceâ, obsoletè radiatâ; dente cardinali, in dextrâ valvulâ solum et minimus; margaritâ albidâ et valdè iridescente.

Hab.—Siam, C. M. Wheatley.

Anodonta Dallasiana.—Testâ lævi, subellipticâ, subinflatâ, inæquilaterali, posticè obtusè angulatâ, anticè rotundatâ; valvulis tenuibus, subdiaphinis; natibus subelevatis, ad apices granulatis; epidermide luteo-viridi et tenebrosâ, eradiatâ; margaritâ cæruleo-albâ et iridescente.

Hab.—Winnepeg, at the mouth of the Saskatchewan River. R. Kennicott.

Description of a new species of UNIO and a MONOCONDYLŒA.

BY ISAAC LEA.

Unio Laosensis.—Testâ lævi, arcuatâ, in medio compressâ, valdè inæquilaterali, anticè et posticè rotundatâ; valvulis subcrassis; natibus prominulis, subcompressis; epidermide tenebroso-fuscâ vel rufo-fuscâ, posticè obsoletè radiatâ; dentibus cardinalibus parvis, striatis, lobatis; lateralibus longis, corrugatis subrectisque; margaritâ albâ et iridescente.

Hab.—Laos Mountains, Cambodia, Siam. Monsieur Mouhot, per H. Cuming, Esq.

Monocondylœa Mouhotii.—Testâ lævi, ovatâ, compressâ, valdè inæquilaterali, anticè rotundâ, posticè, subbiangulatâ; valvulis tenuibus; natibus prominulis; epidermide luteo-fuscâ, eradiatâ; dentibus cardinalibus parvissimis, lobatis; margaritâ albidâ et valdè iridescente.

Hab.—Laos Mountains, Cambodia, Siam. Monsieur Mouhot, per H. Cuming, Esq.

Descriptions of twenty-four New Species of UNIONIDÆ of the United States.

BY ISAAC LEA.

Unio Raleighensis.—Testâ lævi, inflatâ, valdè inæquilaterali, posticè obtusè biangulatâ, anticè rotundatâ; valvulis subcrassis, anticè crassioribus; natibus subprominentibus; epidermide luteo-fuscâ vel-fuscâ, valdè radiatâ; dentibus cardinalibus parviusculis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subcurvisque; margaritâ albâ vel purpureâ et iridescente.

Hab.—Neuse River, six miles east of Raleigh, N. Carolina, E. Emmons, M. D.

Unio Charlottensis.—Testâ lævi, ellipticâ, subcompressâ, inæquilaterali, ad latere parum planulatâ; valvulis subtenuibus, anticè crassioribus; natibus vix prominentibus; epidermide tenebroso-fuscâ, eradiatâ; dentibus cardinalibus parvissimis, compressis, valdè obliquis; lateralibus parviusculis, lamellatis et acuminatis; margaritâ albidâ et iridescente.

Hab.—Near Charlotte, Mecklenberg County, N. Carolina, E. Emmons, M. D.

Unio Mecklenbergensis.—Testâ lævi, ellipticâ, subcompressâ, inæquilaterali, ad latere parum planulatâ, posticè biangulatâ, anticè rotundatâ; valvulis crassis, anticè crassioribus; natibus prominulis; epidermide tenebroso-fuscâ, obsoletè radiatâ; dentibus cardinalibus subgrandibus, striatis crenulatisque; lateralibus longis, lamellatis corrugatisque; margaritâ albidâ vel purpureâ et valdè iridescente.

Hab.—Near Charlotte, Mecklenberg County, N. Carolina, E. Emmons, M. D.

Unio Gastonensis.—Testâ lævi, subellipticâ, valdè inæquilaterali, ad latere planulatâ, posticè vix biangulatâ, anticè rotundâ; valvulis crassiusculis, anticè crassioribus; natibus prominulis; epidermide tenebroso-fuscâ, eradiatâ; dentibus cardinalibus parviusculis, in valvulo sinistro tripartitibus; lateralibus longis, lamellatis subcurvisque; margaritâ purpurescente et iridescente.

Hab.— Mine Creek, Gaston County, N. Carolina, C. M. Wheatley.

Unio Weldonensis.—Testâ lævi, ellipticâ, subinflatâ, sublenticulari, posticè subbiangulatâ, anticè rotundâ; valvulis subcrasssis, anticè parum crassioribus; natibus subprominentibus; epidermide tenebroso-fuscâ vel virido-fuscâ, radiatâ; dentibus cardinalibus parviusculis, crenulatis, in utroque valvulo duplicibus; lateralibus, prælongis, lamellatis subcurvisque; margaritâ albâ vel purpureâ et iridescente.

Hab.—Roanoke River, at Weldon, N. Carolina, E. Emmons, M. D.

Unio aberrans.—Testâ lævi, oblongâ, subinflatâ, valdè inæquilaterali, ad latere planulatâ, posticè obtusè biangulatâ, anticè rotundatâ; valvulis crassiusculis, anticè crassioribus; natibus subprominentibus; epidermide luteo-fuscâ, valdè radiatâ; dentibus cardinalibus parvis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subrectisque; magaritâ cæruleo-albâ vel purpureâ et iridescente.

Hab.—Neuse River, six miles east of Raleigh, N. Carolina, E. Emmons, M. D.

Unio Chathamensis.—Testâ lævi, lato-ellipticâ, subcompressâ, valdè inæquilaterali, posticè obtusè biangulatâ, anticè rotundatâ; valvulis subtenuibus, anticè parum crassioribus; natibus prominulis; epidermide tenebroso-fuscâ vel tenebrosâ, viridi, radiatâ; dentibus cardinalibus parvis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subrectisque; margaritâ albâ vel purpureâ et valdè iridescente.

Hab.—Rocky River, Chatham County, N. Carolina, E. Emmons, M. D.; and James River, near Richmond, Major Le Conte.

Unio mediocris.—Testâ lævi, lato-ellipticâ, subinflatâ, valdè inæquilaterali'

posticè subbiangulatâ, anticè rotundatâ; valvulis subtenuibus, anticè parum crassioribus; natibus prominulis; epidermide luteo-fuscâ, valdè radiatâ; dentibus cardinalibus parvis, striatis, crenulatis; lateralibus longis, lamellatis subrectisque; margaritâ albidâ vel purpureâ et valdè iridescente.

Hab.—Neuse River, Raleigh, N. Carolina, E. Emmons, M. D.

Unio squalidus.—Testâ lævi, subinflatâ, valdè inæquilaterali, posticè subbiangulatâ, anticè rotundatâ; valvulis subcrassis, anticè parum crassioribus; natibus prominentibus; epidermide furvâ, squalidâ, imbricatâ, eradiatâ; dentibus cardinalibns parvulis, striatis, in utroque valvulo duplicibus; lateralibus sublongis, lamellatis subrectisque; margaritâ cæruleo-albâ vel purpureâ et iridescente.

Har.—Neuse River, near Raleigh; Roanoke, near Weldon; and Deep River, N. Carolina, E. Emmons, M. D.

Unio Livingstonensis.—Testâ lævi, oblongâ, subinflatâ, ferè alatâ, valdè inæquilaterali, posticè obtusè biangulatâ, anticè rotundatâ; valvulis subtenuibus; natibus subprominentibus; epidermide tenebroso-fuscâ, eradiatâ vel obsoletè radiatâ; dentibus cardinalibus parvis, lobatis; lateralibus longis, lamellatis subrectisque; margaritâ cæruleo-albâ vel purpureâ vel salmoniâ et valdè iridescente.

Hab.—Livingston's Creek, Brunswick County, North Carolina, E. Emmons. M. D.

Unio quadrilaterus.—Testâ lævi, oblongâ, subinflatâ, ad latere planulatâ, inæquilaterali, posticè biangulatâ et truncatâ; valvulis crassiusculis; natibus prominulis, ad apices undulatis; epidermide tenebroso-fuscâ, eradiatâ vel obtusè radiatâ; dentibus cardinalibus parviusculis, tuberculatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subrectisque; magaritâ albidâ vel purpureâ vel salmoniâ et valdè iridescente.

Hab.—Abbeville District, South Carolina, Dr Barratt. Neuse River, Raleigh and Catawba River, N. Carolina, C. M. Wheatley.

Unio lucidus.—Testâ lævi, ellipticâ, inflatâ, valdè inæquilaterali, posticè subbiangulatâ, anticè rotundâ; valvulis subtenuibus; natibus prominulis; epidermide rufo-fuscâ vel fusco-virente, radiatâ, ad latere micante; dentibus cardinalibus parvis, obtuso-conicis, crenulatis, in utroque valvulo duplicibus; lateralibus sublongis, lamellatis subcurvisque; margaritâ cæruleo-albâ et valdè iridescente.

Hab.—Livingston's Creek, Brunswick County, North Carolina, E. Emmons, M. D.

Unio nasutidus.—Testâ lævi, valdè transversâ, compressâ, ad latere planulatâ, valdè inæquilaterali, posticè acutè acuminatâ, anticè obliquè rotundatâ; valvulis subtenuibus; natibus prominulis, ferè terminalibus; epidermide tenebroso-fuscâ, radiatâ; dentibus cardinalibus parvissimis, acuminatis, in utroque valvulo duplicibus; lateralibus prælongis, tenuibus rectisque; margaritâ subsalmoniâ et valdè iridescente.

Hab.—Livingston's Creek, Brunswick County, N. Carolina, E. Emmons, M. D.

Unio indefinilus.—Testâ lævi, oblongâ, inflatâ, ad latere planulatâ, valdè inæquilaterali, posticè biangulatâ, anticè rotundatâ; valvulis subcrassis, anticè parum crassioribus; natibus subprominentibus; epidermide fusco-nigricante; dentibus cardinalibns parviusculis, tuberculatis, striatis; lateralibus longis, lamellatis subcurvisque; margaritâ albâ, aliquantò purpureâ et iridescente.

Hab.—Long Creek, Mecklenberg County, N. Carolina, C. M. Wheatley; and Neuse River, near Raleigh, E. Emmons, M. D.

Unio cistellæformis.—Testâ lævi, oblongâ, valdè inflatâ, ad latere planulatâ, inæquilaterali, posticè obtusè biangulatâ, anticè rotundâ; valvulis crassiusculis; natibus prominulis; epidermide fusco-nigricante, eradiatâ; denti-

bus cardinalibus parvis, tuberculatis, in utroque valvulo duplicibus; lateralibus sublongis, lamellatis subrectisque; margaritâ albâ et iridescente.

Hab.—Neuse River, near Raleigh, N. Carolina, E. Emmons, M. D.

Unio Waccamawensis.—Testâ lævi, triangulari, inflatâ, ad latere planulatâ, valdè inæquilaterali, posticè subbiangulatâ, anticè rotundatâ; valvulis tenuibus; natibus prominentibus; epidermide fusco-virente vel olivaceâ, obsoletè radiatâ; dentibus cardinalibus parvissimis, compressis, obliquis, in utroque valvulo duplicibus; lateralibus longis, lamellatis rectisque; margaritâ cæruleo-albâ et iridescente.

Hab.—Waccamaw Lake, North Carolina, E. Emmons, M. D.

Unio pertenuis.—Testâ lævi, obovatâ, inflatâ, sublenticulari, inæquilaterali, posticè obtusè biangulari, anticè rotundatâ; valvulis pertenuibus, anticè parum crassioribus; natibus subprominentibus, ad apices rugoso-undulatis; epidermide virente et radiis indutis; dentibus cardinalibus parvissimis, compressis, obliquis; lateralibus acicularis rectisque; margaritâ cæruleo-albâ et valdè iridescente.

Hab.—Neuse River, near Raleigh N. Carolina, E. Emmons, M. D.

Unio perlucens.—Testâ lævi, ellipticâ, subinflatâ, valdè inæquilaterali; valvulis subtenuibus, anticè parum crassioribus; natibus prominulis; epidermide luteo-virente, perlutescens et radiis indutis; dentibus cardinalibus parvis, compressis, crenulatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subrectisque; margaritâ cæruleo-albâ et valdè iridescente.

Hab.—Six Runs, Sampson County, N. Carolina, E. Emmons, M. D.

Unio perlatus.—Testâ lævi, perlatâ, valdè compressâ, ad latere planulatâ, valdè inæquilaterali; valvulis tenuibus, anticè parum crassioribus; natibus prominulis, ad apices undulatis; epidermide fusco-virente, obsoletè radiatâ; dentibus cardinalibus parvissimis, tuberculatis, in utroque valvulo duplicibus; lateralibus prælongis, acicularis rectisque; margaritâ cæruleo-albâ et valdè iridescente.

Hab.—Black Rock Landing, Cape Fear River, N. Carolina, E. Emmons, M. D.

Unio viridulus.—Testâ lævi, transversâ, subcompressâ, ad latere planulatâ, valdè inæquilaterali; valvulis tenuibus, anticè ad marginem parum crassioribus; natibus prominulis, ad apices undulatis; epidermide virente, obsoletè radiatâ, valdè politâ; dentibus cardinalibus parvissimis, tuberculatis; lateralibus longis, acicularis subrectisque; margaritâ cæruleo-albâ et iridescente.

Hab.—Neuse River, near Raleigh, N. Carolina, E. Emmons, M. D.

Unio ablatus.—Testâ lævi, oblongâ, subinflatâ, ad latere parum planulatâ, inæquilaterali, posticè biangulatâ; valvulis crassiusculis, anticè crassioribus; natibus prominulis; epidermide tenebroso-castaneâ, eradiatâ, politâ; dentibus, cardinalibus parviusculis, tuberculatis, in utroque valvulo duplicibus; lateralibus, longis, lamellatis rectisque; margaritâ salmoniâ, aliquantò albidâ et valdè iridescente.

Hab.—Long Creek, Gaston County, N. Carolina, C. M. Wheatley; N. Carolina, J. G. Anthony.

Unio curatus.—Testâ lævi, ellipticâ, subinflatâ, ad latere parum planulatâ, inæquilaterali, posticè biangulatâ; valvulis subcrassis, anticè crassioribus; natibus prominulis; epidermide croceâ, eradiatâ, miscante; dentibus cardinalibus parviusculis, striatis, acuminatis, in utroque valvulo duplicibus; lateralibus longis, lamellatis subrectisque; magaritâ salmoniâ et valdè iridescente.

Hab.—Sugar Creek, N. Carolina, C. M. Wheatley.

Anodonta dolearis.—Testâ lævi, oblongâ, valdè inflatâ, subæquilaterali, posticè obtusè biangulatâ, anticè obliquè rotundatâ; valvulis crassis; natibus

prominentibus et valdè inflatis; epidermide luteo-virente, valdè radiatâ et micante; margaritâ dilutè carneâ et valdè iridescente.

Hab.—Stewart's Milldam, Union County, N. Carolina, C. M. Wheatley.

ANODONTA BEALEI.—Testâ lævi, ovato-oblongâ, subinflatâ, inæquilaterali, posticè subbiangulatâ, anticè rotundatâ; valvulis tenuibus; natibus subprominentibus, ad apices undulatis; epidermide olivaceâ, politâ, obsoletè radiatâ; margaritâ cæruleo-albâ et iridescente.

Hab.—Leon County, Texas, Lieut. Beale.

Notes on the PICIDÆ, with descriptions of new and little known species.

BY JOHN CASSIN.

1. PICIDÆ.

Since the completion of M. Malherbe's great work on the Woodpeckers, "Monographie des Picidées," the study of the birds of this family, so far as relates to a very large majority of the species, is a matter of the utmost facility. In the course of an examination of the species of this group in the Academy Museum, I have been constantly impressed with the extraordinary research exhibited by M. Malherbe in this elaborate and complete Monograph. It must be regarded as one of the most important and valuable contributions ever made to Ornithological science, and is, assuredly, in comprehensive information and accuracy of detail, rarely to be equalled in the present age or any other. It is a model and paragon of Monographs, and a monument of patient research, accurate knowledge and sound judgment.

The collection of Woodpeckers, in the Academy Museum, at present embraces about three-fourths of the species given by M. Malherbe, and I have identified all the specimens of every species in the collection except those described as new in this paper. The careful and usually very accurate figures of females and young birds given by him, have been of great service, and I have never before, in the investigation of any group, been able to thoroughly work up all specimens in however obscure or incomplete plumage. The following statement shows the number of species in M. Malherbe's Monograph and the number in the Academy Museum, under his generic designations:

Genera.	Malh. Mon.	Acad. Mus.	
Megapicus, *Malh*.....	14	13	(Wanting *M. Sclateri*, Malh.)
Dryopicus, *Malh*.....	11	11	
Picus, *Linn*.....	63	46	(Wanting *P. mandarinus, Luciani, assimilis, atratus, undosus, uralensis, syriacus, Wagleri, kamtschatkensis, leucurus, Felieiæ, auritus, canicapillus, meniscus, gymnophthalmus, kisuki, pygmæus.*)
Sphryapicus, *Baird*.....	3	3	
Picoides, *Lacépède*.....	9	6	(Wanting *P. cayennensis, undulatus, undosus.*)
Micropicus, *Malh*.....	3	3	
Dendropicus, *Malh*.....	10	8	(Wanting *D. schoensis, Hemprichii.*)
Phaiopicus, *Malh*.....	9	7	(Wanting *P. sordidus, jugularis.*)
Celeopicus, *Malh*.....	20	13	(Wanting *C. Fraseri, multifasciatus, ochraceus, flavicollis, semicinnamomeus, smaragdinicollis, pyrrhotis.*)
Mesopicus, *Malh*.....	25	20	(Wanting *M. tænionotus, murinus, nigriceps, Kirkii, sanguinolentus.*)

[July,

Indopicus, *Malh.*.....	7	4	(Wanting *I. De Lessertii, philippinarum, Carlotta.*)
Brahmapicus, *Malh.*...	3	3	
Chloropicoides, *Malh.*..	6	5	(Wanting *C. Grantia.*)
Chloropicus, *Malh.*.....	24	22	(Wanting *C. karelini, leucolæmus.*)
Chrysopicus, *Malh.*.....	25	21	(Wanting *C. maculosus, Caillaudi, capricorni, Brucei.*)
Melampicus, *Malh.*.....	13	10	(Wanting *M. melanocephalus, Herminieri, xantholarynx.*)
Xenopicus, *Baird*.....	1	1	
Zebrapicus, *Malh*	15	12	(Wanting *Z. hypopilius, Gerinii, aurocapillus.*)
Geopicus, *Malh*	12	12	
Picumnus, *Temm.*.....	14	7	(Wanting *P. ocellatus, Castelnauii, squamulatus, Lafresnayii, rufoventris, Buffonii, Verreauxia.*)
Picumnoides, *Malh.*.....	3	2	(*P. lachrymosus*, Malh. wanting.)
Yunx, *Linn.*.....	5	4	(*Y. æquatorialis*, Rupp. wanting.
	295	233	

This statement is, however, to be regarded as founded strictly on the views of M. Malherbe, in a few particulars of which I have the misfortune to differ from him. Making deductions for species given by him as valid, which are very probably identical with others, (such as *Picus Martinæ*, Aud., *Phillipsii*, Aud. and some others) and additions for species recently described and not included by M. Malherbe, and also a few species given by him as synonyms, but which appear to me to be properly regarded as distinct, I have determined 236 species of Woodpeckers in the Academy Museum.

2. Picus scalaris, Wagler.

Of the birds regarded as this species or varieties of it, or near allies, there seem to me to be several species, quite distinct from each other and probably inhabiting separate regions of North America.

1. Picus Nuttallii, Gambel.

Malh. Mon. pl. xxiv. figs. 5, 6, 7. Baird, B. of N. A. pl. xli. fig. 1.

Hab.—California. Spec. in Mus. Acad. Philada.

In this species there is in the adult male a wide frontal and coronal space which is frequently clear black, but generally with the feathers having long narrow spots of white at their tips. Immediately succeeding the scarlet of the occiput is a narrow band of white and then a wide band of black. The back is very distinctly banded with black and white—the *black bands being the wider*. The two black stripes from the base of the lower mandible and from behind the eye unite and form a large black space on the side of the neck.

This is a readily defined and easily recognized species and the largest of this group. It appears to be restricted to California.

2. Picus scalaris, Wagler.

Malh. Mon. pl. xxvii. figs. 1, 2, 3, 4, 5.

Hab.—Southern Mexico? Spec. in Mus. Acad. Philada.

Plumage of the head above tipped with scarlet and with small medial or subterminal spots of white. Back with the transverse bands of black and white clearly defined but narrower and more numerous than in the preceding, but with the *black bands the wider*. Smaller than the above and easily distinguished from that species.

3. Picus lucasanus, Xantus.

Picus lucasanus, Xantus, Proc. Acad. Philada., 1859, pp. 298, 302, (not figured).

Hab.—Lower California. Spec. in Mus. Acad. Philada.

Much resembling *P. scalaris*, but with the bill and feet stouter and the bill longer, white spots on the head larger and the black stripes on the back rather narrower.

Scarcely distinguishable from *P. scalaris* and hardly a species, but presents differences which may be constant as stated above. This bird has only been found in Lower California.

4. Picus Bairdii, Sclater.

Picus Bairdii, Sclater. Malh., Mon. i. p. 118.

Malh. Mon. pl. xxvii. figs. 7, 8. Baird, B. of N. A. pl. xli. fig. 2.

Hab.—New Mexico, Northern Mexico. Spec. in Mus. Acad. Philada.

Generally similar to the last two species but with the *white bands on the back wider than the black bands.* Total length about 7 inches, wing $4\frac{1}{4}$, tail $2\frac{1}{2}$ inches.

All specimens from New Mexico and Northern Mexico appear to be this species, and it is that which has heretofore been regarded by the ornithologists of this country as *P. scalaris.*

5. Picus Orizabæ, nobis.

Picus scalaris, var. d'Orizaba, Malh. Mon. pl. xxvii. fig. 6.

Hab.—Jalapa, Mexico, Eastern Mexico? Spec. in Mus. Acad. Philada.

Similar to *P. Bairdii* but smaller, the brownish white stripe immediately below the scarlet of the head, extending over the eye and wider behind the eye than in *P. Bairdii. White bands of the back wider than the black bands.* Total length $6\frac{1}{2}$ inches, wing 4, tail $2\frac{1}{2}$ inches.

Brought from Jalapa commonly, by M. D'Oca and seems to be the representative of this group in Eastern Mexico. There are synonyms usually referred to *P. scalaris* which may be applicable to one or the other of these birds, but I cannot identify them.

6. Picus vagatus, nobis.

Much smaller than either of the preceding, though belonging to the same group and especially resembling the two last described above. *Male.* Head above scarlet, all the feathers being black at base, with small white spots, which are more numerous on the front and vertex, stripes from the base of the lower mandible and behind the eye black, from the base of the upper mandible and another over and behind the eye sordid or brownish white. Back and exposed surface of quills banded transversely with black and white, *which on the back are about equal in width.* Wing coverts black, with circular and oblong spots of white, upper tail coverts black. Under parts brownish white, with circular and irregular spots of black more numerous on the breast and sides and forming transverse bands on the flanks. Tail feathers black, two outer feathers on each side with white bands. Quills brownish black, with quadrangular or irregular spots of white on their outer webs, and large circular spots of white on their inner webs. Bill and feet dark, short feathers on the nares fuliginous.

Total length about $5\frac{1}{2}$ inches, wing $3\frac{1}{2}$, tail $2\frac{1}{4}$ inches.

Hab.—Mexico? Spec. in Mus. Acad. Philada.

Two specimens of this little species are in the Acad. Mus. from the Massena collection, but are unfortunately without labels indicating locality. They are, however, strictly of the same form and generic character as the birds above mentioned, and are probably from Mexico or Central America. This species is easily distinguished from all others of its intimate allies by its much smaller size as above described. It is not larger than *Picus minor*, Linn.

3. Genus POLIPICUS, nobis.

Belonging to the group *Gecininæ*, G. R. Gray, and allied to the genus *Geci-*

nus, Boie, especially to a subgroup of which *Gecinus puniceus* (Horsf.) is the type. Small, bill nearly straight and rather wide at base, wing rather long, first quill very short, fourth, fifth and sixth longest, tail rather long and wide, feet short, outer hind toe longest, inner hind toe short.

The present species is unusually small for a bird of the group to which I regard it as belonging.

4. Polipicus Elliotii, nobis.

Wing rather long, first quill spurious, fifth slightly longest, tail long and wide. Female? Head above black, entire upper parts of body and wings of yellowish olive-green with a golden tinge on the exposed surface of shorter quills and with a reddish tinge on the upper tail coverts. Primaries brownish black, slightly edged with green on their outer webs and having large spots of yellowish white on their inner webs, shafts of quills on their under surface yellowish white. Tail brownish black, outer feathers with dull brownish white spots on their inner webs, under surface of tail tinged with pale greenish yellow.

Superciliary line and cheeks dull bluff, throat and under parts of body greenish or yellowish white, paler and nearly pure white on the throat and darker on the breast, and the entire under parts with longitudinal stripes of brownish black, very narrow on the throat and wider on the breast. Flanks and under tail coverts with a few irregular bands, and sagittate spots of the same brownish black. Bill light brownish, lower mandible and tip of upper nearly white, feet probably light colored. Under wing coverts light yellowish white, with black spots.

Total length, about 7 inches, wing $3\frac{3}{4}$, tail 3 inches.

Hab.—River Muni, Western Africa. One specimen in Acad. Mus. from Mr. Duchaillu's collection.

This is a very curious little woodpecker, having the general form of and even a larger tail than usual in *Gecinus*, and in its group is quite remarkable for its small size. The present specimen is very probably a female, and I regret that no other of the species is in the collection of Mr. Duchaillu, from whom it was purchased.

This bird is named in honor of my friend, Mr. Daniel Giraud Elliot, of New York, one of the most talented and enterprising of the young naturalists of the United States, who, in his "Monograph of the *Pittidæ*" has just completed one of the most important as well as beautiful contributions to ornithology ever made in this country.

6. Campethera vestita, nobis.

Allied to *C. brachyrhyncha* (Swains.) and *C. nivosa* (Swains.) and resembling the former, but larger, with the tail clear black, and the entire upper plumage darker golden green.

Female? Head above brownish black, with numerous small spots of pale brownish white, entire upper parts of body and wings golden green, quills brownish black, with a few small spots of dull white on their outer webs. Tail black, with the middle feathers slightly edged with green, under surface with a greenish tinge, and with the shafts of the feathers yellow. Throat light reddish brown, with numerous small spots of black, entire under parts of body with transverse narrow bands of black and dull greenish yellow, paler on the abdomen, and with a rufous tinge on the breast. Under wing coverts and inner edges of quills pale buff or fawn color (without spots) the latter having some irregular bands of the brownish black of the outer webs. Shafts of quills on their under surface yellow. Bill and feet bluish black.

Total length about $7\frac{1}{2}$ inches, wing 4, tail $2\frac{1}{2}$ inches.

Hab.—St. Paul's River, Western Africa. One specimen in the Academy Museum from Dr. Robert MacDowall's collection.

The description is that very probably of a female specimen, of which I have

never seen a male, and which was received at the Academy in a very interesting collection from Dr. MacDowall, in 1841. This bird seems to be most nearly allied to *C. brachyrhyncha* (Swains.) also a West African species, of which several specimens are in the Acad. Mus., from Mr. Duchaillu's collection, but it differs not only in having the upper plumage a darker and golden green, and the tail clear lustrous black, but the under wing coverts are pale buff or fawn color, without spots, instead of nearly white and spotted with black, as in *C. brachyrhyncha.* It is also larger than that species.

In colors and general appearance this bird bears a greater resemblance to the American woodpeckers, of the genus *Chloronerpes*, Swainson, especially to *C. rubiginosus*, Swain., than any other African species with which I am acquainted.

7. Chrysopicus Malherbei, nobis.

Resembling *C. notatus* (Licht.) and *C. æthiopicus* (Hemp. et Ehrenb.) but much smaller than the former and otherwise different from both. Head above from base of bill to occiput, scarlet, back and upper wing coverts and rump yellowish green, lighter on the back, with numerous, nearly circular and oblong spots of greenish white, exposed surface of shorter quills yellowish olive green, tipped with yellowish white, (but without transverse bands,) primaries dark brown, with small spots of yellowish white on their outer webs, and with large spots of the same color on their inner webs. Sides of head and neck and entire under parts of body pale yellowish white, with nearly circular and oblong spots of black, larger on the breast and sides, smaller on the middle of the abdomen and under tail coverts. Tail yellowish brown, with the shafts and tips of the feathers yellow, obscure transverse bands of a darker shade of brown on the outer feathers, under surface of tail greenish yellow. Under wing coverts pale yellowish white, with a few spots of black. Bill and feet dark plumbeous. Male?

Total length about 6½ inches, wing 3¾, tail 2½ inches.

Hab.—Zanzibar. Spec. in Mus. Acad., Philada.

A single specimen of this species is from the Massena Collection, and is labelled, "Zanzibar" in the same hand-writing as some other specimens from the same locality. In general appearance this bird resembles the much larger *C. notatus* (Licht.) Malh. Mon., pl. 95, figs. 4, 5, 6. from which it differs, not only greatly in size, but in the color of the upper parts of the body, and in having the clearly-defined white circular spots of the back and coverts as described above. From *C. nubicus* (Gm.) Malh. Mon., pl. 93, figs. 2, 3, 4, 5, 6, this bird differs also in size and in the colors of the upper parts. It appears to be smaller also than *C. æthiopicus* (Hempr. & Ehrenb.) Malh. Mon., pl. 94, figs. 1, 2, 3, Rüpp., Syst. Ueb., pl. 36, but differs in the color and circular spots of the upper parts, and has no transverse bands on the shorter quills nor tail as represented in the figures of that species. In the present and only specimen, though the top of head and occiput are bright scarlet, there is no stripe from the base of the under mandible or *moustache* of that color.

Although the specimen now described does bear a considerable resemblance to *Picus notatus*, Licht., which is expressly stated by Messrs. Hemprich and Ehrenberg, in their description of *Picus æthiopicus*, to be the case also in that species (Symbolæ Physicæ, Aves, pt. 1,) it is clearly not the bird described by them nor that figured by M. Rüppell, Syst. Uebers, pl. 36. *P. æthiopicus* is regarded by M. Malherbe as identical with *P. nubicus*, Boddaert, very probably correctly, to which the present bird bears some resemblance also, but not in so great a degree as to *P. notatus.*

This species I have taken the liberty of dedicating to the distinguished author of the "Monographie des Picidées."

8. Picus scintilliceps, Swinhoe.

Picus scintilliceps, Swinh., Sclater's Ibis, 1863, p. 96.

A very fine male specimen of this species in the Acad. Mus. has been labelled in Europe, "*Picus trisulensis*, Licht.," in a hand-writing that I do not recognize. It seems to be the largest of the Asiatic group, characterized by the cinereous front and small lateral spots of scarlet, but ought to be very carefully compared with *P. Mitchellii*, Malh., and *P. auritus*, Eyton, especially as it is brought forward by apparently a very youthful and inexperienced describer, whose early training in both natural and civil history seems to have been unfinished.

9. Picus leucomelas, Boddaert.
Picus canadensis, Gmelin.

I am not prepared, at present, to regard this bird as identical with, or as merely a larger *race* of *Picus villosus*, Linn., though given as such by Prof. Baird in B. of N. Am. i. p. 84,* but am disposed to consider it a distinct species. It is well figured in the folio editiou of Audubon, (pl. 417, fig. 7), though the bill is rather large, but the figure in his octavo edition is not recognizable. Malherbe's figure (pl. 21, fig. 4) is too small, and the spots on the wings are not sufficiently numerous. *Picus Martinæ*, Aud., and *P. Phillipsii*, Aud., are young birds of this species.

Audubon says of this bird: "Its notes alone suffice to distinguish it from every other species, being louder and much shriller than those of *Picus villosus*," (Orn. Biog. v. p. 188). Nuttall adds, "it is also less active and petulaut," (Man. Orn. v. p. 684).

10. Picus Phillipsii, Audubon.

This supposed species was described from a single specimen which now belongs to the collection of Professor Baird of the Smithsonian Institution. Mr. Audubon says, in his description, "This species is about the same size as *P. canadensis*, which it also resembles in color, but is distinguished by the yellow patch on the head and its thicker aud more pointed bill." It is undoubtedly the young of *P. canadensis*, as stated by Prof. Baird in B. of N. Am. i. p. 86, and I quite coincide with him that the original specimen (now in my possession through his kindness) presents all the peculiarities of a young bird. M. Malherbe's figure (pl. xxi. fig. 5) is copied from Audubon, on the authority of whom only he gives this bird as a species.

11. Picus Martinæ, Audubon.

This is also the young of *Picus canadensis*, and the original specimen is in the collection of Professor Baird. It is labelled "Upper Canada," and is in more advanced plumage than that of *P. Phillipsii*, alluded to in the preceding article, but is the same species, in my opinion. Mr. Audubon says, in his description, (Orn. Biog. v. p. 183), "This species is very nearly allied to *Picus villosus*, and is very similar in its colors, but differs in having the mandibles pointed, *in being larger*, in having the top of the head red or yellowish red, and in having its fourth toe longer than the third." This bird is also giveu by M. Malherbe as a species, ou the authority of Mr. Audubon.

12. Picus villosus, Linnæus.

In M. Malherbe's figure of the male of this species (pl. xxi. fig. 1) the white space on the back is too large and the black edgings of the feathers denote immaturity. In the adult bird the back is clear white, the central feathers having no black edges, and very nearly as represented by Audubon, (pl. 416, fig. 1, 2). For all that I can see, *Picus Cuvieri*, Malh. (pl. xxii. fig. 3) is the young female of this species, and *Picus Audubonì*, Trudeau, the young male.

* The proper reference to this very important work is, "Baird's Birds of North America." It was mainly written and entirely arranged by Professor Baird, comparatively small parts only having been contributed by Mr. Lawrence and myself, which are invariably designated as such in the text. Those contributions are as separate and distinct, and represent our individual views as exclusively as if they were in different books. Professor Baird is the author of the article on the *Picidæ*.

The adult male of this species is characterized by a transverse stripe o bright scarlet on the occiput, and so are all other species of typical *Picus* found in North America, which occipital stripe is rigidly defined and restricted.

In younger stages of plumage all the species of this country present very considerable variations in this particular, and generally have more or less pale red, pale yellow, or yellowish red on the top of the head, sometimes extended, but more frequently quite limited. The presence of either of those colors or shades of color in a specimen, is evidence of immature plumage. Similar stages of immature plumage with the head red above, in *Picus major* of Europe, are figured by Malherbe, pl. xvi. fig. 6, and by Naumann, B. of Germany, pl. 134, fig. 3.

This bird very probably associates with *Picus Harrisii* in a region intermediate between the proper ranges of the two species, and produces hybrids, which present difficulties to naturalists. This is undoubtedly the case with *Colaptes auratus* and *C. mexicanus*, as stated by Prof. Baird, in B. of Am. i. p. 122. The same considerations apply to the present species and *P. Harrisii* and others.

13. Picus Cuvieri, Malh., Mon. i. p. 85.

As stated in the preceding article, this bird is, in my opinion, the young female of *P. villosus*.

14. Picus Audubonii, Swainson.

Picus Audubonii, Swains., Faun. Bor. Am. Birds, p. 306, (1831).

Picus Auduboni, Trudeau, Jour. Academy, Philad. vii. p. 404, (1837), Aud. B. of Am. pl. 417, oct. ed. iv. pl. 265 ; Malh. Mon. pl. xxii. fig. 4.

The descriptions here cited seem, singularly enough, both to apply to the same supposed species, though Dr. Trudeau evidently was not aware of the descriptiou of Mr. Swainson. The two descriptions seem, in fact, to have been made quite independently of each other, yet each author gave the same name to the same bird, a coincidence certainly of rare occurrence. Both seem to apply to males of *Picus villosus*, Mr. Swainson having described an adult of unusually small size from the State of Georgia, and Dr. Trudeau, a young male from Louisiana.

The fine *blue* color of Mr. Audubon's figures, above cited, is entirely erroneous and fanciful, but in his description the color is given fairly: "The upper parts are black, the tufts covering the nostrils white." M. Malherbe's figure is a correct representation. A specimen, probably the original of Dr. Trudeau's description, is in the collection of Professor Baird of the Smithsonian Institution.

15. Picus Harrisii, Audubon.

This species resembles *P. villosus*, but in nearly all specimens is easily distiuguished by the clear black and unspotted wing coverts and shorter quills. In apparently adult specimens from northern localities especially, the under parts are generally more or less tinged with dull brown, generally not so dark as represented in Audubon's plate (pl. 417, fig 8, 9) and frequently very light. Occasionally, and I suspect in the perfect spring plumage, the back and under parts are pure white, as described and figured by Malherbe, (pl. xx. fig. 1. 2). Dr. Gambel states that this is the case: "The young are brownish beneath, as represented by Audubon, but the adult is pure white," (Jour. Acad. Philad. i. p. 55).

Specimens occasionally occur in which white spots are present on the shorter quills and coverts, but generally small and not numerous. Young birds present colors analogous to those of the young of *P. villosus* and *P. canadensis*. Very fine specimens of adults and young of this species are in the Academy Museum, from collections made in California by Mr. John G. Bell and Dr. William Gambel.

[July,

Young ♂. Crown red, many of the feathers having small spots of white, occiput with a few scarlet feathers. Upper parts of body black, tinged with brown, white spots on the primaries smaller than in adult. Back with a wide longitudinal stripe of white, many of the feathers having black spots on their edges. Upper tail coverts black. Under parts dull white.

Younger ♂. Crown coppery red, front black, with white spots. Wing almost clear brownish black, a few small spots only on the external webs of primaries. Under parts dull white. No red feathers on occiput.

Specimens occur occasionally which can be assigned to either this species or *P. villosus* with equal propriety, and may be hybrids.

16. Picus Jardinei, Malherbe.

This bird much resembles *P. Harrisii*, Aud., with which it is given as identical by Dr. Cabanis, in Journ. Orn. 1862, p. 175. There are in the Academy Museum two specimens only, the better of which was brought by Mr. D'Oca from Jalapa, Mexico, and both are the species described by M. Malherbe and represented in his plate xxv. fig. 4, 5, though they appear to be in more mature plumage. The scarlet of the head is restricted to the occiput in both specimens, and the two outer tail feathers are without black spots, though the second feather has a black space at the base of the inner web. In young birds it is unusual to find the clearly defined scarlet occiput, as in the present specimens, for which reason, mainly, I dissent, though with some misgivings, from Dr. Cabanis' conclusion. These specimens are much like the young of *Picus Harrisii*, described above, except in the matter of the scarlet occiput. They have the under parts of the body rather strongly tinged with ashy brown for southern specimens of *P. Harrisii*, and very nearly as figured by M. Malherbe, as above cited.

17. Picus pubescens, Linnæus.

This little species, which is of common occurrence in North America, presents some variations in size, which fact I think has led to errors in descriptions of supposed species. Both *Picus meridionalis*, Swains., and *Picus medianus*, Swains., are very probably to be referred to this bird. *Picus Lecontei*, Jones, is very probably an accidental variety, and so also possibly is *Picus leucurus*, Prince Paul of Wurtemberg.

This bird probably associates with *P. Gairdneri* in an intermediate region, and produces hybrids.

18. Picus Lecontei, Jones.

Picus Lecontei, Jones, Ann. Lyc. Nat. Hist. N. Y. iv. p. 489, (1847).

Ann. Lyc. N. Y. pl. 17; Malh. Mon. pl. xl. fig. 7.

The original and only specimen known of this species is in the Academy Museum, though it belongs to Dr. Jones of Georgia, who is its describer. This specimen is rather smaller than usual in specimens of *Picus pubescens*, in which respect, as suggested by Dr. Jones in his description, it is like *P. meridionalis*, Swains., but otherwise and in all other respects it is nothing more than *Picus pubescens*, with three toes instead of four!

This bird has attracted some attention from European Ornithologists. The Prince Bonaparte made it the type of his genus *Tridactylia*, and M. Malherbe is disposed to regard it as a true species. At present my opinion is that it is an accidental specimen only of *Picus pubescens*, which opinion is subject, of course, to immediate correction on the production of other specimens, which, as Dr. Jones says, very candidly and properly, "will be necessary to establish the species perfectly."

19. Picus Gairdneri, Audubon.

Picus Gairdneri, Aud., Orn. Biog. v. p. 317.

Baird B. of N. A. pl. 85, fig. 2, 3.

In nearly all specimens of this little species the under parts are tinged with

brownish ashy instead of being pure white, as in *P. pubescens*, which it much resembles. This color of the under parts varies in shade in different specimens, as in *Picus Harrisii*, and is probably correctly stated by Prof. Baird to be darker in the more northern specimens, though the supposition entertained by him, that such is always the case in this species and in *P. Harrisii*, is not without grave difficulties, especially in view of the migration southward of northern specimens, which takes place to an extent sufficient to interfere with such a theory, even in species stated to be "resident." I suspect that the dark color of the under parts in these species is acquired much as stated by Mr. Audubon to be the case in *Picus pubescens:* "I have observed," he says, "that during their stay in the Floridas, Georgia and the Carolinas, their breasts and bellies are so soiled by the carbonaceous matter adhering to the trees in consequence of the burning of the grass at that season, that one might be apt to take a specimen in that state as belonging to a different species." (Orn. Biog. ii. p. 82).

Specimens occasionally have been brought in collections which seem to combine the characters of this species and of *P. pubescens*, and suggest a presumption of hybridity. Of this description apparently is *Picus Turati*, Malherbe.

20. Picus Turati, Malherbe.

Picus Turati, Malh., Mon. i. p. 125, pl. xxix. fig. 5, 6.

The figures of this bird in M. Malherbe's plate much resemble small specimens of *Picus pubescens* except in the black stripes on the side of the head, which are more like those in *P. Gairdneri*. It may be a distinct and valid species, but I suspect that it is founded on intermediate specimens which are probably hybrids of the two species. The localities given by M. Malherbe are California and the Rocky Mountains.

21. Picus albolarvatus, Cassin.

At the time of the publication of Prof. Baird's great work, "The Birds of North America," but few specimens of this species were known to be extant, which fact fully warranted him in stating it to be "an exceedingly rare species, not more than three or four skins being known to exist in collections." Since that period, however, other specimens have been received from Capt. John Feilner, U. S. Army, who obtained them in the vicinity of Fort Crook, California, in which district it is apparently of frequent occurrence.

22. Picus Macei, Vieillot.

This species varies in size very considerably, but three specimens in the Academy Museum are decidedly larger than all the others. Two of them were received in the fine Indian collection made by Capt. T. Boys, of the East Indian Company's service, and were labelled "*P. nepalensis*" in England. These specimens may be the *Dendrocopus pyriceps*, Hodgson, and are so much larger than the usual specimens of *P. Macei*, that their specific distinction is quite possible.

23. Picus puncticeps, D'Orbigny et Lafresnaye.

D'Orb., Voy. Am. Mer. Ois. pl. 64, fig. 1.

With original specimens from M. D'Orbigny's collection before me, I am at present disposed to regard this bird as distinct from *P. lignarius*, Molina, though given as synonymous by M. Malherbe. M. D'Orbigny's figure, cited above, represents the female, which is rather smaller than the male of the same species in the Academy Museum, but both are so much smaller, lighter colored, and different in some other particulars, that I cannot regard them as identical with *P. lignarius*. The black stripes on the under parts in *P. puncticeps* are narrower and less numerous than in *P. lignarius*. The figure in M. D'Orbigny's plate faithfully represents the size and other characters of the female, and the full figure given by M. Malherbe represents the male of *P.*

lignarius with eqnal fidelity, but is rather small. In undoubted Chili specimens in the Academy Museum, the longitudinal stripes on the under parts are wider than as given by M. Malherbe, and confluent, forming apparently continued bands in the adult bird.

24. Picus Ledouci, Malherbe.

Picus minor var. *algeriensis*. Label in Academy Museum.

Of this species, or variety, there are four specimens in the Academy Museum all labelled "Algeria." Though not in adnlt plumage, they present some points of difference from *P. minor*, and I snspect that the species is about as valid as some of the near allies of *P. major*, *medius*, and others which are held to be entirely respectable specifically.

25. Picus borealis, Vieillot.

The Woodpecker described and figured by Vieillot (Ois. d'Arn. Sept. 11, p. 66, pl. 122,) is, in my opinion, a valid species, and qnite as distinct from *P. querulus*, Wilson, as *Picus Harrisii* is from *P. villosus*, and the differences are as easily seen, with specimens of both under examination. In *P. borealis* the transverse bands on the back and shorter quills are much more numerous, especially on the latter, as so are also the spots on the outer webs of the primaries. So far as I can judge from rather badly prepared specimens of *P. querulus*, it has a wide *transverse* band of black on the neck behind, which is but narrow in *P. borealis*. The two species are very nearly the same size.

Vieillot alone, so far as I know, figures this species ; and though his representation is by no means satisfactory, yet it is recognizable as the northern species. Wilson, Audubon, and Malherbe figure the bird of the Southern States, which is *P. querulus*, Wilson. Specimens of the present bird from Pennsylvania are in the Academy Museum.

26. Picus querulus, Wilson.

Described by Wilson from specimens obtained in North Carolina : but his figure (pl. 15, fig. 1,) is not satisfactory. This species is very handsomely given in the plates of both Malherbe and Audubon, but the latter seems only to have known this bird, like Wilson, as a southern species. As stated in the preceding article, this bird is distinct from the similar bird of Pennsylvania, and can readily be distingnished by the smaller nnmber of the transverse bands on the back and shorter quills,—especially of the latter,—and by the much smaller number of spots on the wing coverts and outer webs of primaries.

Specimens are in the Academy Museum from Sonth Carolina and Georgia, in both of which States it appears to be a common species.

27. Picoides dorsalis, Baird.

Baird, B. of N. Am. ii. pl. 85, fig. 1.

This bird is, I suspect, identical with *P. americanus* (Swainson). In the European *P. tridactylus*, the whole space on the back presents precisely the same styles of character in different specimens, as in both *P. americanus* and *P. dorsalis*, that is to say: in some specimens there is a plain wide longitudinal band of white, as in *P. dorsalis*, and in others this band is crossed by transverse bands of black, as in *P. americanus*. This difference is not held to be sufficient to indicate specific distinction. Several specimens of each description are in the Academy Museum, undoubtedly the same species, and figures of each are so given by Malherbe, Mon. pl. 38, and Naumann, B. of Germ., pl. 137.

One specimen only of this bird is in the Acad. Mus., which was brought in a collection from Pike's Peak, Kansas, and is the second specimen known, In my opinion, this bird bears no intimate relation to *P. crissoleucus*, Brandt., which is also in the Acad. Mns. The latter is an ally of *P. tridactylus*, bnt distinguished readily by the pure, nearly unspotted white of the under parts

and of the inferior wing coverts, and is very accurately represented by M. Malherbe, (pl. 40).

28. Campephilus albirostris, (Vieillot.)

Amongst numerous specimens of this species in the Acad. Mus., there is one which presents some differences in color, and may not be quite identical. It is a female specimen, rather smaller than the females of *C. albirostris*, and has the black of the breast more extended downwards; the under tail coverts are blacker, and the shafts of the tail feathers are clear lustrous black. This specimen is labelled "Columbia," and was obtained in Europe for the Academy by Dr. Thomas B. Wilson.

29. Campephilus trachelopyrus, (Malherbe.)

This species is singularly nearly related to *C. rubricollis* (Boddaert), but does persistently retain one valid and reliable character. In *C. rubricollis* the *inner webs* of the longer primaries (only) are fine yellowish-brown or *bay color*, while in *C. trachelopyrus* that color in the same feathers extends to the *outer web also*. In the latter species there is, on this account, on the closed wing a longitudinal band of that color, perhaps not sufficiently conspicuous in M. Malherbe's figures of the male (pl. 8, fig. 2).

30. Sphyrapicus nuchalis, Baird.

Sphyrapicus nuchalis, Baird, Rept. Surv. and Exp. Pac. R. R., ix., p. 103, 921, (1858.)

Baird. B. of N. A., pl. 35.

Although in his description here cited, Professor Baird relies mainly on the fact that this species has a transverse stripe of red on the nape, I suspect that character to be not the most reliable, though the species I regard as entirely valid. One specimen in the Academy Museum, which was received in the Massena collection in 1847, is, I think, clearly this species, though the nape is merely dull white, as in *S. varius*. This bird is very handsomely figured in Professor Baird's plate above cited, and the distinction between it and *S. varius* can be seen with the utmost readiness.

31. Sphyrapicus thyroideus, (Cassin.)

Picus thyroideus, Cass., Proc. Acad. Phila., 1851, p. 439.

Malh. Mon., pl. 38, fig. 1. Cass., B. of Cal. and Tex., pl. 43.

Formerly a very rare species, this bird has been found recently in more considerable numbers at Fort Crook, Northern California, by that true lover of Natural History and industrious collector, Capt. John Feilner, of the U. S. Army. The figures above cited seem to be either females or young males. The most mature of Capt. Feilner's specimens are probably adult males, and only differ from the females in having a few red feathers on the throat, and the rather deeper yellow of the abdomen.

32. Sphyrapicus Williamsonii, (Newberry.)

Picus Williamsonii, Newb., Rep. Pac. R. R. Surv. and Exp., vi. p. 89.

Malh. Mon., pl. 36, fig. 4. Baird, B. of N. A., pl. 34, fig. 1.

This very handsome bird, also, has been obtained by Capt. Feilner at the locality mentioned in the preceding article, and it is probably of not uncommon occurrence in North-Eastern California.

(To be continued.)

August 4th.

Dr. Bridges, Vice-President, in the Chair.

Six members present.

August 11*th*.

Dr. Bridges, Vice-President, in the Chair.

Seven members present.

August 18*th*.

Dr. Bridges, Vice-President, in the Chair.

Eight members present.

The following paper was presented for publication:

"Description of a new generic type of Ophidioids. By Theo. Gill."

August 25*th*.

Dr. Bridges, Vice-President, in the Chair.

Seven members present.

On report of the respective committees, the following papers were ordered to be published:

Description of a new species of CHŒROJULIS from North Carolina.

BY THEODORE GILL.

The discovery of a representative of the genus *Chœrojulis*, so far north as the coast of North Carolina, appears to be worthy of special notice. It is therefore now described, and, as the genus is for the first time introduced into the Fauna of the United States, a diagnosis of it is likewise given.

Genus CHŒROJULIS Gill.

Halichœres *Rüppell*, Neue Wirbelthiere zu der Fauna von Abyssinien gehörig, *Fische*, p. 14, 1835.

Halichœres *Günther*, Annals and Magazine of Natural History, ser. 3, vol. viii. p. 386, 1861.

Halichœres *Bleeker*, Proc. Zoological Society of London, 1861, p. 411.

Chœrojulis *Gill*, Proc. Academy of Natural Sciences of Philadelphia, 1862, p. 142.

Prochilus sp. *Klein*.

Labrus sp. auct. vet.

Julis sp. *Cuv.* et *Val* et al.

Chlorichthys, Ichthycallus and Halichœres, sp. *Swainson*.

Platyglossus sp. *Günther*, (Cat. Fish, iv. 143.)

Body compressed, oblong, with the height generally equal to a fourth or fifth of the length, rarely more.

Scales rather large, (l. l. 26–30) little smaller on the front of the back, the breast and base of caudal.

Lateral line deflected under the posterior third of the soft dorsal, and generally branched on each scale.

Head naked, compressed, conic in profile, with the *preoperculum* entire. *Mouth* scarcely protractile, with the cleft moderate and little oblique.

Teeth in each jaw conspicuous; in front two or four curved canines, and behind, in the upper jaw, a canine tooth directed forwards on each side.

Dorsal fin continuous, with nine pungent spines, and eleven to fourteen

rays; angulated or rarely obtuse behind. *Anal* with three graduated spines: neither with a scaly basal sheath.

Caudal fin truncated or rounded behind and without produced angles.

Ventral fins beneath or nearly beneath the pectoral, and generally produced at the outer ray.

The genus *Chœrojulis* is co-extensive with that for which Dr. Bleeker has retained the name of *Halichœres*, adopted from Rüppell, but as the latter name had been previously applied by Nilsson, under the very slightly modified form of *Halichœrus*, but etymologically identical, to a valid genus of the mammalian family Phocidæ, another one is requisite, and that of *Chœrojulis* has therefore been proposed for the ichthyic genus.

Swainson's name *Ichthycallus* cannot be used, for, although the first and several other species were representatives of the present genus, "*Halichores*" itself was adopted with the limits assigned to it by Rüppell and said to have the "general shape and structure of *Ichthycallus, but there is a* conspicuous canine tooth, as large as those in front, at the hind part of the upper jaw on each side, and which projects beyond the mouth." Swainson had never seen any species referred to *Ichthycallus*, and consequently did not know that any had hinder canine teeth, but distinguished his group from "Chlorichthys," which had the "teeth as *Labrus*, the two most anterior incisors in each jaw longest" by the *smaller scales*, "often concealed by the skin" (!) and the "caudal fin, truncate or rounded." This diagnosis is more applicable to the species of *Coris* than any other included under it, and *Ichthycallus* may therefore primarily be referred as a synonym of that genus, as well as Swainson's *Julis*. It may not be unnecessary to remark that Swainson did not intend the first species enumerated to be considered the type, but generally placed the type at or near the centre. The following enumeration will illustrate the character of *Ichthycallus*:

I. dimidiatus *Spix*, pl. 53.	Chœrojulis internasalis ex *C.* et *V.*
I. chloropterus *Bloch*, pl. 288.	Chœrojulis chloropterus.
I. trimaculatus *Griff.*, pl. 45, f. 2.	?
I. decussatus *Benn.*, pl. 14.	Hemitautoga centiquadrus *Blkr.*
I. auromaculatus *Ib.*, pl. 20.	Coris cingulum *Gthr.*
I. semidecorata *Less.* Atl., pl. 35, f. 2.	Chœrojulis chloropterus (*bis*).
I. Geoffroyii *Frey.* Atl., pl. 56, f. 3.	Macropharyngodon Geoffroyii *Blkr.*
I. umbrostygma *Rüpp.* Atl. ii. pl. 3, f. 2.	Julis umbrostigma *Rüpp.*
I. semipunctatus *Ib.*, pl. 3, f. 3.	Coris cingulum *Gthr.* (*bis*).
I. cyanocephalus *Ib.*, pl. 286.	?
I. Julis *Ib.*, pl. 287, f. 1.	Coris Julis *Gthr.*
I. bivittatus *Ib.*, pl. 284, f. 1.	Chœrojulis bivittatus.
I. macrolepidotus *Ib.*, f. 2.	Novaculichthys macrolepidotus *Blkr.*
I. ornatus *Linn. Tr.*, xii. pl. 27.	(Latiloid.)

Chœrojulis grandisquamis Gill.

♀ The greatest height of the body scarcely exceeds a quarter of the total length, and is about twice as high as the caudal peduncle, that of the latter equalling an eighth. The head forms almost a fourth of the length, and its height is less than a fifth. The eye has a diameter equal to a sixth of the head's length, and the interorbital area equals a fifth. The outline from the dorsal fin to the forehead is slightly convex, and thence rectilinear and declining at an angle of 50° to the axis. The snout equals a third of the head's length. The preoperculum is rectangular, with its angle rounded, the lower or free half of its posterior margin vertical and the inferior horizontal. The subopercular flap extends nearly to the vertical from the posterior margin of the third scale of the lateral line, and is decurved above and obtusely angulated behind. The interoperculum is broad, the upper margin being nearly parallel with the upper. The upper jaw extends nearly to the vertical from the front of the

[Aug.,

orbit, and is continued about $3\frac{3}{4}$ times in the length of the head. The two front teeth of the upper jaw are slightly divergent: the two median of the lower convergent and smaller; the outer ones nearly equal and curved backwards and outwards; the hinder canines normally developed.

The dorsal fin increases backwards without interruption; the spinous portion considerably, the soft little; the last ray is contained $2\frac{1}{2}$ times in the head's length. The caudal is subtruncated, and its angles are rounded. The pectoral is contained $6\frac{2}{3}$ times in the length: its upper angle is obtusely rounded, the posterior margin slightly angulated between the sixth and seventh rays, below which the rays rapidly diminish. The ventral fins are inserted beneath the lower axillæ of the pectorals and are of little equal or little greater length; the first ray is moderately produced at its inner branches.

The scales are delicately striated; those on the breast are larger than those behind the nape. The lateral line is deflected beneath the penultimate to the last dorsal rays; each scale has generally three radiating branches, thicker towards the ends; more seldom two or four.

D. IX. 11. A. III. 12. C. II. 1. 6. 5. 1. III. P. I. 1. 11. V. I. 5.

Scales $26\frac{2}{10}$—

The color in spirits is dark chestnut or brownish red. There appears to be a slight indication of a temporal band. On the membrane behind the operculum and below the axil of the branchial aperture, is a very dark vertical spot bordered behind by steel blue. The dorsal is cloudy, but on the soft portion has a clear band with a submarginal dark line. The anal has indication of three bands, the basal being separated from the median by an undulated line and the marginal being clear. The caudal is marbled, and with a marginal dark band widening towards the angles. The pectorals and ventrals are clear and without axillar spots.

A single specimen of this species, six inches long, was obtained by Wm. Alexander, U. S. A., at Beaufort, North Carolina, on July 11, 1860, and was shortly afterwards forwarded to the Smithsonian collection (4318).

On an unnamed generic type allied to SEBASTES.

BY THEODORE GILL.

In examining the various species of Fishes in the collection of the Smithsonian Institution that have been referred by their several describers to the genus *Sebastes*, attention was arrested by the characters afforded by the *Sebastes kuhlii* of Lowe and Günther, and the *S. filifer* of Valenciennes. These forms represent a group that apparently well merits a special generic denomination which is therefore now conferred on it. The following synopsis will serve to exhibit the most noticeable distinctions of the genera hitherto confounded under the name of *Sebastes*:

I. Dorsal spines XIV+I. (Vertebræ 12+19 pm.)..... ..... Sebastes.

II. Dorsal spines XI.—XII.+I. (Vertebræ 10–11+14.)

A. Palatine teeth developed.

a. Suborbital bone ecarinate.

Scales moderate. Lower jaw little projecting..... Sebastichthys.

Scales minute. Lower jaw protruded..... ..... Sebastodes.

β. Suborbital carina serrated..... ..... Sebastoplus.

B. Palatine teeth obsolete .... Sebastopsis.

The genus *Sebastodes* Gill, has been recently unduly extended by the assemblage under it of species more nearly allied to the type of *Sebastichthys*, and quite dissimilar to that of *Sebastodes*.*

* See *Ayres*, Proc. Cal. Ac. Nat. Sci., vol. ii.

Genus SEBASTOPLUS Gill.

Sebastes sp. *Auct.*

Body oblong, much compressed, and with the caudal peduncle rather low or narrow.

Scales moderate (60–65), ctenoid, arranged in very oblique rows, and with no supernumerary ones. Lateral line simple, in scales like the others.

Head scaly, oblong, with the profile uniformly declining, pointed at the snout, and with no coronal depression. Supraciliary and coronal crests conspicuous. Cheeks with a serrated horizontal carina continued from the preorbital beneath the eye to the hinder margin of the preoperculum above or on a line with the superior spine. Preorbital with two recurved teeth below.

Preoperculum obliquæ behind, broadly rounded towards its angle, with a muciferous channel, and armed along its margin with four spines decreasing downwards.

Operculum with two spines, continued forwards as converging keels, the lower more prominent.

Filaments and barbels obsolete.

Mouth narrow, but rather large, the supramaxillars extending behind the anterior half of the eye, and truncated. Jaws nearly even; the upper not protractile and separated at the symphysis; the lower low in front, received within the upper and with a tubercle below its symphysis.

Teeth villiform on the jaws, vomer and palatine bones; a wide naked interval at the symphysis of the upper jaw is toothless.

Dorsal fin with its spinous part convex above, depressed towards its soft portion, and with twelve (XI.+I.) spines, the penultimate of which is smaller than the last. Anal fin short and deep and with its second spine longest. Caudal subtruncated.

Pectoral fins with rather slender and generally entire articulated rays. Ventral inserted nearly below the pectoral and angulated externally.

Type. Sebastoplus kuhlii.

Syn. Sebastes kuhlii *Lowe* = Scorpæna kuhlii *Bowd.*

The genus is most nearly allied to *Sebastodes* and *Sebastichthys*, but is readily distinguished by the serrated infraorbital crest, the form of the lower jaw and the unarmed interval at the symphysis of the upper, as well as by the armature of the preoperculum and the simplicity of the pectoral rays.

Besides the type, the *Sebastes filifer* of Valenciennes is the only species which is known to me to be certainly referrible to the genus. The latter species appears to be very closely related to *S. Kuhlii*, and it is not perhaps impossible that it may even be the same, although Valenciennes expressly says, that the "scales have smooth borders."* It is very difficult to believe that there should be such a difference between two so evidently nearly related species, although Johnson, in his remarks on *Setarches Güntheri*,† admits the species without hesitation, and refers to the cycloid scales; but he had probably never seen the species.

Sebastoplus Kuhlii Gill.

Scorpæna kuhlii *Bowd.*, Exc. in Mad., p. 123.

Sebastes kuhlii *Lowe*, Trans. Zool. Soc., vol. ii. p. 176; Fishes of Madeira, p. 115, *Günther*, Acanth. Fishes, ii. p. 102.

Sebastoplus filifer Gill.

Sebastes filifer *Val.*, *Webb.* et *Berthelot*, Hist. Nat. des Iles Canaries, *Ichthyologie.*

The figure (1) named *Sebastes kuhlii* on the plate illustrating also the *S.*

* Les ecailles à bord lisse sont de moyenne grandeur.

† *Johnson*, Proc. Zool. Soc., 1862.

filifer has been referred to under the name of *Scorpæna serofa* in the text, where it is said that the name of *Seb. kuhlii* was on the former given "par erreur." The figure in question, however, reminds one rather of the *Sebastes dactyloptera* (*S. imperialis* C. et V.,) rather than either of the two cited, and exhibits none of the *distinctive* generic characters mentioned in the diagnosis of *Scorpæna* given by Valenciennes, neither the "*corpus lobulis cutaneis fimbriatum*," nor the "*genæ et maxillæ nudæ alepidotæ*."

Description of a new generic type of OPHIDIOIDS

BY THEODORE GILL.

In introducing a hitherto unknown type of Ophidiinæ to the notice of naturalists, it becomes requisite to give a description of the genus *Ophidion* which shall contrast with that of the new type.

The so-called "barbels" of the Ophidioids are not the homologues of the barbels of the Mulloids and the Polymyxioids, although so similar in external, appearance, but as their connection and articulation indicate, modified ventral fins recognized as such by Poey, and, although under erroneous impressions, by Philippi.

Genus OPHIDION Artedi.

Synonymy.

Ophidion *Artedi*, Genera Piscium, p. 25.
Ophidium *Linnæus*, Systema Naturæ, vol. i. p. 431.
Ophidium *Cuvier*, Regne Animal, ed. 2, tome ii. p. 359.
Ophidion *Girard*, Report on the Survey and Explorations, &c., for a Pacific Railroad Route, vol. x. Fishes, p. 138.
Ophidium *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 376, 1862.

Body much compressed, moderately elongated, with the height nearly uniform as far as anus and thence decreasing backwards to the end, which is more or less obtusely angulated.

Anus in the second-third of the total length.

Scales small conspicuous, oblong, not imbricated, but obliquely arranged in opposite directions.

Lateral line concurrent with and near the back, not continued to caudal fin.

Head naked, much compressed, oblong-ovoid laterally, with the profile descending in a nearly straight line to the snout; snout rather low and abruptly decurved or subtruncated. Eye moderate, with the pupils comparatively well developed. Opercula unarmed.

Nostrils simple; the first near the front of the snout; the posterior a short distance in front of the eye.

Mouth narrow, with the cleft oblique, and rather large, the supramaxillars extending under the whole or nearly the entire eye: they are rather broad and only retractile near the upper margin under the suborbital chain.

Teeth on the jaws villiform with an outer row of immoveable and blunt ones. Vomer prominent, and, as well as the palatine bones, armed with blunt teeth.

Branchial apertures very ample, arched above by the membrane which is attached above the axilla of the pectoral fins.

Branchiostegal rays seven.

Dorsal fin commencing more or less behind the vertical from the base of the pectoral fins, low and with the rays simply articulated, blending behind, as well as the anal, with the caudal, which is very short and terminates in an obtuse point.

Pectoral fins moderate, obliquely rounded behind.

Ventral fins bifid and articulated, moderately developed and nearly or quite as long as the head.

Pyloric appendages none.

Type. Ophidium barbatum *Linn.*

Genus LEPTOPHIDIUM Gill.

Body much elongated, moderately compressed, and with the back and abdominal regions arched, more compressed and slowly decreasing in height backwards to an abruptly-rounded point.

Anus towards the end of the first third of the length.

Scales regularly imbricated in quincunx, oval, with the nucleus in front of the centre, and with striæ radiating backwards.

Lateral line concurrent with and near the back for about half the length, obsolescent behind.

Head with imbricated scales extending to forehead, opercula and cheeks, moderately compressed, oblong-ovate in profile, with the snout high, projecting forwards, and obtusely rounded, armed above with a short, nearly concealed spine, directed forwards and somewhat downwards. Cheeks somewhat inflated. Eyes large, subcircular, with comparatively small pupils. Nostrils double; the anterior aperture a short tube directed forwards and next to the groove separating the preorbital from the nostril region; the posterior a longitudinal fissure in front of the eyes below the preorbital groove. Opercula unarmed.

Mouth broader, with the cleft little oblique and moderate; the supermaxillar bones are slender, terminate under the hinder part of the eye, and are almost wholly retractile under the suborbitals.

Teeth of the jaws villiform, immersed in a mucous membrane, separated by an interval from the longer ones in the outer row, which are pointed and moveable.

Vomer not prominent, armed, as well as the palatine bones, with teeth.

Branchial aperture ample, arched above by the membrane, which is attached in front of the axil of the pectoral fin.

Branchiostegal rays seven, the internal two small.

Dorsal fin commencing less than a head's distance from the nape, rather low and with its rays simply articulated, blending behind, like the anal, with the caudal fin, whose rays are longer than those of the dorsal and anal, and whose margin is produced.

Pectoral fins small or moderate, obliquely rounded behind.

Ventral fins bifid and articulated, and much abbreviated.

This genus is exceedingly distinct from *Ophidium*, having very few characters in common, except such as would be found in the genera of the same subfamily. Its form at once distinguishes it, its comparatively low and moderately compressed body and the smaller head contrasting strongly with the much compressed body and head of the true *Ophidia;* the imbricated scales and peculiar dentition observed on closer examination corroborate the generic distinction indicated by the difference of form.

It is probable that the *Ophidium brevibarbe*, briefly indicated by Cuvier and Kaup, belongs to this genus; by Cuvier, it was simply alluded to in a foot-note of the Regne Animal, while by Kaup a short diagnosis was given in the "Catalogue of the Apodal Fish." As the notice of the species by Kaup, like most of the diagnoses by that gentleman, is only sufficient to distinguish it from species known to him, no clear idea can be obtained regarding its affinities. But, as it is said to have "on the point of the snout a short decurved spine," "scaly occiput and gill-plate, and long, tapering pointed caudal fin," while "the remaining species are destitute of the rostral spine, and have fewer or no scales on the occiput and gill-covers,—they are also shorter," it is likely that a species somewhat related to the *Leptophidium* was in view. Before the

species can, however, be considered congeneric with the latter, the character of the "strong teeth" must be better known.

LEPTOPHIDIUM PROFUNDORUM Gill.

The greatest height equals about a tenth of the extreme length, and is developed at the pectoral region; it thence almost uniformly decreases to the end, and at the anus equals an eleventh of the same; the thickness behind the pectoral fins equals seven-tenths of the height, and almost uniformly decreases to the end like the height. The anus is at the end of the first third of the length.

The head forms rather less than a sixth of the length, and is transversely convex above and moderately inflated on the sides; the greatest width equals half its length. The eye is rather longer than the snout, subcircular, and its diameter slightly exceeds two-sevenths of the head's length; its pupil is small, the diameter equalling only a third of that of the eye. The width of the interocular region rather exceeds two-ninths of the head's length. The supramaxillary ends behind under the hinder margin of the pupil.

The dorsal fins commence nearly over the middle of the pectoral fin, and with the second fifth of the length and is moderately high; the anal commences immediately behind the anus, and is about as high as the dorsal; the caudal rays of the fin are the longest. The pectoral fin little exceeds half the head's length, and the longest branch of the ventral is less than a third of the head's length, and three-fifths greater than the shorter.

The color is a light rufous; the vertical fins margined with black.

The following table shows the relative proportions:

Extreme length, (7 in.) 100; Length to end of middle caudal rays.

Body.—Greatest height 10; greatest width 7; height at anus 9; width at anus 7; height between anus and caudal $6\frac{1}{2}$.

Head.—Greatest length 16; distance from snout to nape 11; greatest width 8; width of interocular area $3\frac{1}{2}$; height of preorbital $1\frac{1}{5}$; length of snout 4; length of supramaxillary 6.

Eye.—diameter $4\frac{1}{2}$; diameter of pupil $1\frac{1}{2}$.

Dorsal (*spinous*).—Distance from snout 21; height over anus 4; height near caudal 5.

Anal.—Distance from snout 33; height at middle $4\frac{1}{2}$; height near caudal 4.

Caudal.—Length of middle rays $5\frac{1}{2}$; length of external rays.

Pectoral.—Length $8\frac{1}{2}$.

Ventral.—Length of longer branch 5; length of inner branch 3.

A single specimen of this species, seven inches in length, was obtained by Commodore Rodgers, from the sounding line, at a depth of thirty fathoms in the Gulf stream, off the coast of Florida. It is in very fine condition.

The species is distinguished from the *brevibarbe*, if that fish indeed belongs to this genus, at least by the more anterior anus, the smaller mouth and the more posterior origin of the dorsal fin.

Sept. 1*st.*

MR. CASSIN in the Chair.

Seventeen members present.

Mr. Kilvington exhibited a specimen of Arctic soil, brought home by Dr. Hayes in a box with Arctic plants. After repeated trial, Mr. K. had failed to induce anything to grow in the soil.

The following papers were presented for publication:

"Synopsis of the subfamilies and genera of Berycoids;" "Synopsis

1863.]

of the North American Gadoids;" Description of the genera of Gadoid and Brotuloid Fishes;" "Synopsis of the Lycodoidæ;" and "Synopsis of the Lepturoids," etc. By Theodore Gill.

"On Strepomatidæ, etc." By S. S. Haldeman.

Sept. 8th.

Dr. McEuen in the Chair.

Sixteen members present.

Prof. Porter made the following communication:

During the month of August of the present year I devoted a day to the collection of fresh-water shells from the Juniata River, near Alexandria, Huntingdon County, Penna., and whilst engaged in the search, observed large numbers of *Unio complanatus*, Say, which had left the channel of the stream and crawled to its very margin, into little shallow pools, where the water was quiet and warm. They lay with the hinge down and the edge up, the valves slightly apart. This struck me as singular, and I touched several of them with my cane, when the valves were forcibly closed, and a greenish slime ejected upward for a considerable distance. The slime did not dissolve, but floated on the surface. I afterward noticed pools that were covered with it, no doubt from voluntary emissions. This mucus-like substance was probably the semen of the male. I had no microscope with me of sufficient power to reveal the presence of spermatozoa, and have since regretted that I did not bring some of the material home for examination. Some of the individuals observed may have been females, in a similar position, in order to receive impregnation.

The following were presented for publication:

"Notes on the Labroids of Western North America," and "Synopsis of the Pomacentroids," etc. By Theo. Gill.

Sept. 15th.

Dr. Bridges, Vice-President, in the Chair.

Fourteen members present.

Dr. Leidy exhibited a female Phalangopsis, which he had found in an active condition rolled in a leaf of a spice bush, *Benzoin odoriferum*, in the manner of the lepidopterous leaf rollers, for which he happened to be seeking at the time. This habit was new to him, nor had he observed any previous account of it. The insect he had always found beneath stones and logs. The edges of the cone enclosing the insect adhered apparently by a mucoid cement, and had every appearance of having been made by the Phalangopsis, which hopped away after it was released.

Sept. 22d.

Dr. Bridges, Vice-President, in the Chair.

Fifteen members present.

The following were presented for publication :

"Descriptions of the Gobioid Genera of Western North America," "Note on the Genera Hemiramphinæ," and "On the Genus Periophthalmus." By Theo. Gill.

"Description of a collection of Jasper Lance-heads, found near Trenton, N. J." By Charles C. Abbott.

"Descriptions of new and little known species of Picidæ, etc." By John Cassin.

Sept. 29th.

Mr. Vaux, Vice-President, in the Chair.

Eighteen members present.

On report of the Committee, Mr. Cassin's paper, read Sept. 22d, was ordered to be published in the Journal.

On leave granted, Dr. Bridges presented a paper entitled "Supplement to descriptions of soft parts and embryonic forms of Unionidæ." By Isaac Lea. Which, on report of a Committee, was ordered to be published in the Journal.

On report of the respective committees, the following were ordered to be published :

Synopsis of the POMACENTROIDS of the Western Coast of North and Central America.

BY THEODORE GILL.

As some of the species of the family of Pomacentroids inhabiting the Pacific waters of our continent have been involved in confusion, and very diverse species united, the present article is submitted in rectification of such errors, and of others formerly committed by the author.

The family of Pomacentroids is accepted with the types referred to it by Dr. Günther ; that gentleman has, however, lately established a genus called *Melambaphes** for a species supposed to be the *Glyphisodon nigroris* of Cuvier, which he is uncertain whether to refer to the present family or the "group Cantharina" of the Sparoids. His description does not enable us to positively decide, as he does not describe the course of the lateral line, which would have probably enabled one to refer it to its proper family,—the lateral line being interrupted in the Pomacentroids, and continuous in the Sparoids and Pimelepteroids. As the new genus is, however, characterized by its "small ciliated scales" (L. lat. 100), the presence in each jaw of "a series of trenchant, tricuspid teeth, and with a broad band of villiform teeth behind," and of "fourteen or thirteen spines in the dorsal fin, and three in the anal fin," there can be little doubt that it belongs to Günther's "group Cantharina."

The following artificial table will assist in the determination of the genera. *Lepidozygus*, *Parma* and *Acanthochromis* are genera unknown to me through autopsy:

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* Melambaphes *Gthr.*, An. and Mag. Nat. Hist., ser. 3, vol. xi. p. 115. Dr. Gunther is perhaps mistaken in referring this species to the *Glyphidodon nigroris*, C. et V. ; those naturalists were too keen and profound to have placed a species of *Melambaphes* in *Glyphidodon* after an examination which induced their surprise in discovering three anal spines, notwithstanding the resemblance to the *Glyphidodon rahti* and *bengalensis*. It is possible that the third spine was an ossified ray. The *Melambaphes* of Gunther having been then named from a misconception, it is better that it should obtain a new name that shall not perpetuate the error: it may therefore be called *M. Guentheri*.

I. Scales large or moderate (24—40); opercular bones scaly and not striated ..... POMACENTRINÆ.
A. Dorsal spines 12—14.
B. Scales in less than 30 oblique rows.
C. Teeth compressed, uniserial.
* Teeth fixed, entire.
1. Preopercnlum serrated in adult ..... Pomacentrus.
2. Preopercnlum entire; scales in about 14 longitudinal rows ..... Pomataprion.
3. Preopercnlum entire. Scales in about 20 longitudinal rows ..... Hypsypops.
** Teeth fixed, more or less notched in middle.
1. Snout acute. Preorbital low. Teeth emarginate ..... Glyphidodon.
2. Snout blunt and high. Preorbital high. Teeth deeply notched ..... Euschistodus.
*** Teeth immovable, tricuspid ..... Dischistodus.*
**** Teeth in the upper jaw moveable ..... Microspathodon.
CC. Teeth conical, in more than one row.
* Preopercnlum entire ..... Chromis.
** Preopercnlum serrated ..... Dascyllus.
BB. Scales in 35—40 oblique rows.
Preopercnlum serrated ..... Lepidozygus.
Preopercnlum entire ..... Parma.
AA. Dorsal spines about 17 ..... Acanthochromis†
I. Scales small (45—70). Opercnlum and subopercnlum radiatedly striated ..... AMPHIPRIONINÆ.
* Opercnlum and subopercnlum spinous ..... Amphiprion.
** Opercnlum and subopercnlum serrated. Preorbital with a long spine ..... Premnas.

Subfamily *POMACENTRINÆ* Gill.

Genus POMACENTRUS Gill.

This genus includes only two Californian species, the *P. quadrigutta* and *P. Bairdii*, formerly referred to it, belonging to another. The two species may be briefly distinguished as follows:

Synopsis.

I. Lower limb of the preopercnlum scaly; height nearly equal to one-third of total length. Head above (in youth), with a blue line on each side continued uninterruptedly backwards to each side of the dorsal ridge; another parallel line is continued backwards from the upper angle of the eye. Back of caudal peduncle with ocellus.
a. Color similar above and below, in youth diffused blue on the centres of the scales, and with a dorsal ocellus. In the adult uniform purplish brown, and with no dorsal ocellus ..... P. rectifrænum.
β. Color above brownish, with blue on the centres of the scales; below the lateral line and on tail brownish yellow; and in front of latter, *dotted* with blue on each scale. Dorsal ocellus very distinct in adult as well as young ..... P. flavilatus.

* *Type.* Pomacentrus fasciatus *C. et V.*
† *Type.* Dascyllus polyacanthus *Bikr.*

Pomacentrus rectifrænum Gill.

Pomacentrus rectifrænum *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 148.
Pomacentrus rectifrænum *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 26.
Pomacentrus rectifrænum *Gill*, in *Günther's* op. cit., vol iv. p. 27.
Pomacentrus analigutta *Gill*, in *Günther's* op. cit., vol. iv. p. 27.

This species undergoes great change with age, and on two suites of specimens two nominal species were formerly based, the author having been deceived by the comparatively long retention of the colors of the young in several individuals, and the early assumption of the adult state by others.

The color in extreme youth, as represented in a specimen eight lines long, is reddish-brown, with blue lines obliquely crossing each scale, and forming as many subvertical, scarcely interrupted blue lines crossing the body as there are rows of scales. On the back and lower part of the anterior soft dorsal is a large ocellus, and behind the fin is a smaller one. The *head* above has two very distinct blue lines continued from the snout over each eye, where they are most distant, and again approximating and continued, one on each side of the base of the dorsal fin, but under the fin rather broken into a linear row of spots; another line crosses the eye-ball above, and behind the upper angle of the orbit is a line which is continued to the row of scales above the lateral line; a bar crosses the preorbital; a line runs along the suborbital chain; another line extends backwards from the corner of the mouth, and under the suborbital one; and a blue line colors the upper lip. On each of the opercular scales is a bluish blotch. The dorsal and anal fins are spotted with blue, a spot existing on each scale, and a blue bar crosses the base of the last anal rays. The caudal is brownish, as are also the pectorals. The ventrals dark, and the spine outside bluish, like the front of the anal.

These colors are retained until the fish has attained a length of more than two inches, the chief change being effected by the slightly greater isolation of the spots on the rows above the lateral line, so as to break their continuity as lines; and especially in the fading away of the blue ring and ocellus of the dorsal, which has then become very faint, and is the first to disappear. Finally, in the very aged specimens, more than three inches long, the color of the body and scaly portion of the fins has become almost a uniform brownish-chesnut; and very indistinct traces of the lines on the upper surface and sides of the head are perceptible. The naked portions of the dorsal and anal, as well as the ventral fins, are very dark, and the pectorals yellowish, The profile is also apparently steeper and more convex; and the body more obese.

In studying the development of this species, I have had before me not less than thirty-two individuals, exhibiting every gradation, from the specimen eight lines long to one nearly three inches and a half long,—having discovered since my former studies several important specimens in a collection made at Panama by Capt. Dow. My opportunities for knowing the changes of this species, as well as the West Indian ones, have, therefore, been much greater than Dr. Günther's.

Pomacentrus flavilatus Gill.

Pomacentrus flavilatus *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 148. *Gill*, in *Günther's* Catalogue of the Fishes in the British Museum, vol. iv. p. 27.
Pomacentrus rectifrænum pt *Günther*, (excl. desc.)

This species, so far as known, undergoes little change during its progress to adult age.

The color above the lateral line, and on the scaly portion of the dorsal fin before the middle of its soft part, is dark-brown, with blue on the centre of

each scale; while a large ocellus, very dark-blue, margined with light, adorns the back and the dorsal fin between the last spine and the sixth ray; and a small ocellus is on the back of the tail, behind the dorsal fin. Below the lateral line and behind the dorsal ocellus, the color is brownish-yellow, darker in front along the margins of the scales, and with an indistinct bluish *dot* in the centre of each scale, except on the caudal peduncle, where they are absent. The *head* above has two blue lines; one on each side, continued from the snout backwards on the nape; another line is continued from the upper angle of the orbit to the row of scales above the lateral line. A bar crosses the preorbital, and a line interrupted passes along the suborbital chain; a bar is behind the ends of the maxillary. The scales on the cheeks and opercula are dotted with blue. The dorsal fin, behind its produced rays, as well as the anal, caudal, pectoral and ventral fins, are yellowish; the former faintly marked with blue on its scales, and margined in front with dusky; the ventrals are likewise margined on their outer edges with dusky.

Genus POMATAPRION Gill.

This genus is very closely related to *Hypsypops* and *Pomacentrus*, but is distinguished from the former by the much higher and more covered scales, arrayed in about fourteen longitudinal rows; the prolongation of the lobes of the caudal fin, and the scaly snout. From *Pomacentrus* it differs in the entire preopercnlum in the extremely old as in the young, and the higher preorbital region. From *Euschistodus* it is distinguished by the entire teeth; from *Glyphidodon* by the entire teeth, elevated preorbital region, form of the head, &c.; and from *Parma* by the size of the scales.

There are two Californian species of this genus, which may be distinguished as follows:

I. Lower limb of the preopercnlum naked; height of body contained abont $2\frac{2}{3}$ times in the total length. *Head* above in youth, with two blue lines, one on each side, decurrent over or behind the eye, and two blue spots or lines on nape. Back of tail behind dorsal with a dark spot bordered in front by blue.

   a. Body uniformly colored, with two whitish blue spots above lateral line below fourth and last dorsal spines..... ..... P. dorsalis.

   β. Body below and tail yellowish, without distinct blue spots. Occipnt with two parallel blue lines in youth..... P. Bairdii.

Pomataprion dorsalis Gill.

Hypsypops dorsalis *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 147 (old).

Pomacentrus quadrigutta *Gill*, op. cit., 1862, p. 149 (young). *Gill*, in *Günther's* Catalogue of the Fishes in the British Mnsenm, vol. iv. p. 27. *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 27.

Glyphidodon dorsalis *Günther*, op. cit., vol. iv. p. 50.

In the young, the color of the body is a purplish-brown, varied with blue on the centre of each scale, the blue diminishing on the scales of the tail towards the fin. On each side there is a blue spot on the first scale above the lateral line, on the scale above the seventh of the lateral line and below the fourth dorsal spine, and another on the one above the fifteenth scale and below the eleventh or twelfth spine; on the tail, behind the dorsal fin, there is a transverse dark band, bordered in front by blue. The head above has two blue lines, one on each side, running from, and decurved over, the eye behind the orbit. The forehead is indistinctly marked with blue in the centre of each scale; and on the nape there are two oblong blne spots, one on each side. A continuous blue line is continued from the side of the snout along the suborbital chain, and unites with the line decurrent behind the orbit.

[Sept.

Behind the end of the supramaxillary, there is a vertical blue bar. The scales of the cheeks and opercula are spotted with blue in the centre. Lips immaculate brown. The dorsal fin on its scaly portion is similar to the back; the anal has a blue spot at the base of its last rays, and its front, like the outer edge of the ventral fin, is blue. The pectoral inside has also a blue line across the base of the upper rays.

As the fish advances in age, the blue on the centres of the scales fades, and, finally, the color of the whole body, as well as the scaly portions of the fins, become a purplish-brown; but the spots on the scales above the first, seventh and fifteenth (sixteenth) scales of the lateral line remain, as does also the one bordered before by blue in the rear of the dorsal fin. The coloration on the head simply becomes fainter, and the lines narrower and somewhat interrupted. The fins are uniform and spotless, except the pectoral, which retains the transverse bar which was assumed in its youth.

This species, in its young state, was formerly described as a *Pomacentrus*, the preoperculum having a scolloped appearance, produced by the muciferous ducts and their mouths, and thus simulating the serrature of young *Pomacentri*, misleading Dr. Günther as well as myself,—especially as it had the coloration and form of a *Pomacentrus*. The border in the old is not so much exposed, and is perfectly entire, while the preorbital has gained in elevation at the expense of the eye. The uniform color of the body is also in strong contrast to the variegated sides and fins of the young.

The smallest specimen obtained by Mr. Xantus is nearly an inch and a half long; and nine were obtained varying from that length to little more than two inches,—none offering any essential difference. A single adult, distorted, and presenting a peculiar appearance, having a length of little more than four inches, was also collected.

Pomataprion Bairdii Gill.

Pomacentrus Bairdii *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 149. *Gill* in *Günther's* Catalogue of the Fishes, &c., vol. iv. p. 27.
Pomacentrus rectifrænum pt. *Günther*, (excl. desc.)

The color in extreme youth, as represented by a specimen ten lines long, is greenish-yellow, modified by blue above on the middle of each scale, the margins alone being brownish; below a line drawn from the axil of the pectoral to that of the dorsal fin, the blue has disappeared, and the brownish-yellow is conspicuous, sprinkled over with a few faint, darker dots, which themselves become obsolete on the abdomen and caudal peduncle; immediately behind the dorsal fin there is a dark spot, margined in front by blue. The *head* above has two blue lines continued from snout and decurved over the eye-ball and behind the orbit; on the forehead there is a transverse blue bar, and on the nape two nearly parallel longitudinal blue lines. An oblique blue bar crosses the preorbital; a series of blue dots on the suborbital chain is continued to meet the deflected line behind the eye, and there is a blue bar behind the end of the maxillary. The lips and opercula are brown. The dorsal fin, on its scaly portion, including all the spinous portion, except a marginal band, and the lower half of the soft, is blue, the scales scarcely being margined by brown; the other fins are colorless, except the margin of the anal, which is dark.

The species, with advancing age, loses the intensity of the blue above, but that color spreads downwards faintly, and is perceptible on all the scales except those of the abdomen and hinder portions of the caudal peduncle. The blue on the upper surface of the head and the preorbital finally becomes obliterated, but the series on the infraorbital chain and the bar behind the maxillary remains, while the opercula assume blue dots. The fins also, especially the ventral and anal, have become dusky.

I have seen nine specimens of the *Pomataprion Bairdii*, from Cape St. Lucas

and Panama, varying from ten lines to two inches and a half in length, and have been thus enabled to study the development of the coloration, which is quite peculiar in the gradual spreading of the blue, while it becomes fainter at the same time with age. The species is closely allied to the *P. quadrigutta*, having nearly the same height, the naked lower limb of the preoperculum, and the pattern of the upper surface of the head. It has high preorbital bones, and a wide convex forehead.

The specimen mentioned under this name in Dr. Günther's Catalogue, can scarcely belong to it, as that author would otherwise not have confounded it with the *P. rectifrænum*, which belongs to a different genus. The name under which the *P. Bairdii* was sent has doubtless by some accident been shifted to the young of *P. rectifrænum*, and the specimen of the former lost.

Genus HYPSYPOPS Gill.

Synonymy.

Hypsypops *Gill*, Proc. Academy of Natural Sciences of Phila., 1861, p. 165.
Hypsypops *Gill*, op. cit., 1862, p. 147.
Glyphisodon sp. *Girard.*
Parma sp. *Günther.*

Body oblong-oval, with the dorsal and inferior outlines correspondent, rapidly contracted under the soft dorsal and anal fins, constricted behind those fins, and with the caudal peduncle short and high.

Scales little or no higher than long, subpentagonal, with a muricated border behind; arranged in less than thirty oblique rows, and about twenty longitudinal ones. Smaller ones extend far on the vertical fins. Lateral line tubular, terminated under the posterior portion of the dorsal fin.

Head rather higher than long, constricted at the nape, with the forehead prominent, in front of which the profile is steep, but depressed, and the snout protuberant and jaws rounded. Infraorbital chain in front elevated, higher than the diameter of the eye, subangulated at the corner of the mouth, and thence trending very obliquely upwards and backwards, under and behind the eye. Eyes rather small. Preoperculum unarmed; operculum with a bony projection behind. Cheeks with rather small scales; operculum and suboperculum with large ones. Preorbital, and region in front of forehead, naked.

Mouth small, with its periphery semioval, and the supramaxillaries ceasing in front of the eyes; little retractile under preorbital; surmounted by a strong ridge. Lips rather thick, continuous at angle with each other; lower free all around.

Teeth fixed, uniserial, contiguous, narrow, blunt and entire; in a short, semioval row, and behind deflected outwards and downwards on the upper jaw; in the lower, in an oblong, semioval row.

Branchiostegal rays five.

Dorsal fin with twelve subequal spines, and the soft portion produced in front of the middle and emarginated behind.

Anal fin armed with two stout spines, and with a soft portion like the dorsal.

Caudal fin notched, with the lobes rounded.

D. XII. 16. A. II. 15. C — P. — V. 1. 5.

$$\text{Scales } 28 \begin{matrix} 5 \\ — \\ 14 \end{matrix}$$

Hypsypops rubicundus Gill.

Synonymy.

Glyphisodon rubicundus *Girard*, Proc. Academy of Natural Sciences of Phila., vol. vii. p. 148, 1854. *Girard*, Explorations and Surveys for a Railroad Route, &c., vol. x. *Fishes*, p. 161, pl. xxiv. *Girard*, op. cit., vol. x. Whipple's Report, *Zoology*, p. 51.

Hypsypops rubicundus *Gill*, Proc. Academy of Natural Sciences of Phila., vol. xiii. p. 165, 1861.

Parma rubicunda *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 58.

This species, which has only twenty-eight transverse rows of scales, has been referred by Dr. Günther to his genus *Parma*, characterized by having the scales "in more than thirty transverse series," thus distinguished from *Glyphidodon*, which has the "scales in 30 or less transverse series." It is, however, due to Dr. Günther, to add that he was logically correct from the data in text in making such an approximation, the species having been truthfully affirmed by Dr. Girard to have twenty longitudinal rows; but no mention was made of the number of transverse ones. The species is, however, distinguished by the comparative longitudinal extension of the scales, which is accompanied by a less number compared with the longitudinal rows than might have been expected. On the other hand, Dr. Günther was logically in error in giving the new name *Parma* to his genus, as he supposed the type and only species which originally served for *Hypsypops* was a true representative of the former genus; and the latter name in such a case would, of course, have had to be retained. The characters on which *Hypsypops* was founded were certainly quite different from those serving for *Parma*; which were the most valuable is not for the reviewer to decide. As the two types, however, belong to different genera, *Parma* should be retained for the species having its characters.

The figure accompanying Girard's description is incorrect as to the form of the dorsal and anal fins and the size of the opercular scales. The fins are acutely produced in advance of the middle, and emarginated behind, while the scales of the operculum are rather smaller than those of the sides. The number of transverse rows of scales is correctly given.

Genus EUSCHISTODUS Gill.

This genus, as already remarked, has the physiognomy much like that of *Hypsypops* and *Pomataprion*, but is distinguished from them by the deeply grooved and notched teeth, and is, perhaps, really more nearly allied to *Glyphidodon*. Two species are found along the Western Coast of America, and a third species, closely related to one of the former, is found on the opposite side of the continent.

Euschistodus concolor Gill.

Euschistodus concolor *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 145.

Glyphidodon concolor *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 37.

This species, which is very distinctly banded in youth, loses its bands in old age, and becomes of a uniform chocolate or purplish-brown, with a brown breast and abdomen.

A species very nearly related to *E. concolor*, having almost exactly the same proportions, number of rays (D. XIII. 12. A. II. 10. P. 18.), scales, $(26\frac{4}{9})$, &c., is found on the eastern coast of the isthmus, one specimen from Aspinwall having been sent to the Smithsonian Institution by the Rev. Mr. Rowell. The color is purplish-brown, dotted with green on the centre of each scale, and with the throat and abdomen covered with a lake-colored coat. The teeth are smaller, there being twenty-one or -two on each side of the upper jaw, seven of which are in the deflected portion behind; and in the lower jaw there are about twenty-five on each side. The anal fin has its produced portion rounded, rather than angular, as in *E. concolor;* and in the specimen

collected, the lower lobe of the caudal fin is subtruncated behind, but perhaps is abnormally so. To this species are possibly referrible the specimens from the island of Cordova, enumerated under the head of *E. concolor* by Günther. The Aspinwall type may be named *Euschistodus analogus*.

EUSCHISTODUS DECLIVIFRONS Gill.

Euschistodus declivifrons *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 37.

Glyphidodon declivifrons *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 38.

This species extends from Cape St. Lucas to Panama, where a fine adult specimen was obtained by Capt. Dow.

Genus GLYPHIDODON Lac.

GLYPHIDODON TROSCHELII Gill.

Glyphidodon Troschelii *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 150. *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p 36.

Hab.—Cape St. Lucas.

Genus CHROMIS Cuvier.

Heliases *Cuv.* et *Val.*
Furcaria *Poey.*
Heliastes *Lowe*, *Günther.*

The genus *Chromis* was especially established upon the *Sparus chromis* of Linnæus, by Cuvier, in the year 1815, in the "Mémoires du Musé um d'Histoire Naturelle;" and therefore the name must be retained for that type, while the *bolti* of the Nile must assume the name *Tilapia*, as M. Auguste Duméril and the author have shown.

I am not yet able to perceive any generic distinction between *Chromis* and *Furcaria*, although Prof. Poey was quite correct in his statement that the latter has sometimes seven branchiostegal rays, as he has forwarded to me a preparation of the *F. puncta*, exhibiting that number. I have myself dissected out a membrane with six rays.

CHROMIS ATRILOBATUS Gill.

Synonymy.

Chromis atrilobata *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 149.

Heliastes marginatus pt. *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 64.

The color is dark-green, tinged with olive above, and lighter below, while there is a very distinct sulphur spot behind the dorsal fin. The head above is very dark, light-green on the sides, silvery on the preorbital region. The soft portion of the dorsal fin is blackish, except the hinder portion (four or five rays), which is yellowish. The anal fin is greenish, dotted with black, and with the spines green. The caudal fin is greenish yellow, dotted with black, with a black band along each lobe, and with the margins above and below bordered with greenish. The pectoral and ventral fins are greenish; the former black at the base.

The snout is rather shorter than the eye. The teeth of the outer row are enlarged, and behind them is a narrow band of scattered ones.

There are four longitudinal rows of scales between the median dorsal row and the lateral line.

This species is apparently as closely related to the *Chromis puncta* ex Poey as to the Brazilian *C. marginata*, or *Heliastes marginata* of Castelnau, with which it has been, on too slight grounds, identified by Dr. Günther, and in

spite of the difference in the number of the scales, especially those between the back and lateral line.* The colors of the two species are also different, the present having a very distinct sulphur-yellow spot immediately behind the dorsal fin, and extending obliquely forwards and downwards, as in *C. puncta*. This character was inadvertently omitted in the original description.

Notes on the LABROIDS of the Western Coast of North America.

BY THEODORE GILL.

Within the short time that has elapsed since the publication of the descriptions of the Labroids of Lower California, two most important works relating wholly or in part to the Labroid alliance have been given to the world. Dr. Bleeker, after having published in the Proceedings of the Zoological Society of London,† and of those of the Royal Academy of Amsterdam,‡ an analytical conspectus of the family of Labroids, in his great work on the Fishes of the Indo-Molluccan Archipelago, has with great precision described and figured the numerous species of those seas. Dr. Günther has also issued the fourth volume of his Catalogue in which he has introduced some slight modifications in the generic arrangement formerly proposed by him, and has given diagnoses of all the determinable species.

The family of Labroids as understood by the writer has the limits assigned to it by Bleeker, the families Scaroids and Siphonognathoids being apparently valid. Günther has embraced the three under one family, and has even referred the genus *Siphonognathus* to a "group," including in addition *Odax*, *Coridodax* and *Olistherops*, considering the genera *Odax* and *Siphonognathus* "as closely and naturally allied as *Sus* and *Babirussa*." *Siphonognathus*, however, disagrees with Günther's diagnosis of the Labridæ in having no "*ventral* fins thoracic, with one spine and five soft rays," and instead of the "branchiostegals five or six," only four. As I both believe that a genus should have the chief characters of the family in which it is introduced—views shared with most naturalists—and believe that those characters in which *Siphonognathus* differs from the Labroids are important in this group of families, especially when joined to such a modification of form as it presents, I eliminate from the Labroids that genus formerly recognized as the type of a peculiar family by myself and shortly afterwards by Bleeker. If two such dissimilar groups have any analogies, I should say that *Siphonognathus* and *Odax* bear the same relation to each other as *Sus* and *Hippopotamus*—types of distinct families.

The generic distinctions of Dr. Bleeker seem to be in almost all cases happy, and the subfamilies Cheiliniformes, Pseudolabriformes Pseudodaciformes, (= *Pseudocina* Gthr.) Chelioniformes, Labriformes, (= *Labrina* Gthr.) Odaciformes and Clepticiformes appear to be natural, although concerning the first and fifth there may be some uncertainty. The other subfamilies—Novaculæformes, Labrichthyiformes and Cossyphiformes—appear to require revision.

Dr. Günther has enunciated for the first time a most interesting and important generalization for the Labroids which may also be extended to other families. "In those genera which are composed entirely or for the greater part of tropical species, the vertebral column is composed of twenty-four or nearly twenty-four vertebræ, whilst those which are chiefly confined to the temperate seas of the northern and southern hemisphere have that number in-

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* It is possible that the number of transverse rows of scales, and the longitudinal rows below the lateral line, given in my former description, may be too high, and is at least doubtful,—the scales having been mostly rubbed off, and only ascertainable through the scars left by them.

† Op. cit., 1862, pp. 408—418.

‡ Verslagen en Mededeelingen der Koninklijke Akademie von Wetenschappen, Amsterdam, vol. xiii. pp. 94—109.

creased in the abdominal and caudal portions." This generalization as applicable to the representatives of Acanthopterygian families generally, can be considered in connection with the predominance of the true Malacopterygian fishes in northern waters—fishes in which the increase in the number of vertebræ is a normal feature.

In the following list, no revised decriptions of the species are offered, as all have been since admitted. The object is chiefly to sustain the generic nomenclature formerly proposed. From this must be excepted the genera *Oxycheilinus* and *Crassilabrus* Swainson, which were based on false characters, the figures of the types having been defective. It is possible that those types are generically distinct, but their true characters require to be yet given. The name *Malacocentrus* must be also suppressed, Dr. Bleeker having slightly previously given to the same genus the name *Novaculichthys*. The distribution of the genera among subfamilies is admitted with much hesitation.

Subfamily *CHŒROPINÆ* (Gthr.)

Genus HARPE (Lacépède) Gill.

This genus was originally founded by Lacépède for the reception of the species since generally known as the *Cossyphus bodianus* C. V.; it was characterized by the dentition,—allusion being made to the presence of the enlarged teeth at the front of the jaws as well as behind, and the intervening small teeth erroneously described as compressed and triangular,—and by the falciform production of the dorsal, anal and ventral fins, as well as the extension of the outer rays of the caudal. To it was also erroneously attributed a compressed and triangular barbel on each side near the commissure of the lips, a mistake probably due to some defect in the drawing which afforded Lacépède his knowledge of the genus. It was only known through a design of the naturalist Plumier. As the genus and species are recognizable from the description of Lacépède, the name should have been retained for that group of which his species is the type, even if Cuvier's subsequent name *Cossyphus* had not been pre-occupied.

The genus *Cossyphus* as finally limited by Bleeker and Günther is scarcely natural as such, five according to the author's views being embraced in it. Günther, in his revised list, has admitted seventeen species, besides two as doubtful; these may be distributed among the genera, indicated in the analytical table given below.

The genus *Harpe* contains five known species,—*H. rufus* (=Cossyphus bodianus *C. V.*); *H. pulchellus* (C. p. *Poey*); *H. eclancheri* (*G.* ex *Val.*) and the two species of Lower California.

I. Posterior canine tooth developed. Scales l. l. 30—34 (—36).
  α. Dorsal and anal fins never produced into falciform lobes (old world).
    1. Limbs of preoperculum scaly; head oblong, snout produced in front..... Lepidaplois.*
    2. Limbs of preoperculum scaly; head high, snout decurved from forehead, and rather abbreviated..... Euhypsocara.†
    3. Limbs of preoperculum naked; snout convex.... Gymnopropoma.‡
  β. Dorsal and anal fins produced into very long falciform lobes in adult, (new world)..... Harpe.
II. Posterior canine teeth obsolete. Scales of lateral line about 39..... Achœrodus.§

* Type. Cossyphus axillaris *C. V.*
‡ Cossyphus bilunulatus *C. V.*
† Cossyphus anthioides *Gthr.*
§ Cossyphus Gouldii *Rich.*

HARPE DIPLOTÆNIA Gill.

Harpe diplotænia *Gill*, Proc. Acad. Nat. Sci. Phila., 1863, p. 140.
Cossyphus diplotænia *Gthr.*, Cat. iv. 110.
Hab.—Cape St. Lucas.

HARPE PECTORALIS Gill.

Harpe pectoralis *Gill*, Proc. Acad. Nat. Sci. Phila., 1863, p. 141.
Cossyphus pectoralis *Gthr.*, Cat. iv. p. 110.
Hab.—Cape St. Lucas.

Subfamily *JULIDINÆ* (Gthr.)*

Genus JULIS (Cuv.) Günther.

JULIS LUCASANA Gill.

Julis lucasana *Gill*, Proc. Acad. Nat. Sci. Phila., 1862, p. 142.
" " *Günther*, Cat. iv. p. 184.
Hab.—Cape St. Lucas.

Genus CHŒROJULIS Gill.

CHŒROJULIS SEMICINCTUS Gill.

Synonymy.

Julis semicinctus *Ayres*, Proc. California Academy of Natural Sciences, pt. ii. p. 32.
Chœrojulis sp. ? *Gill*, Proc. Academy of Natural Sciences of Philada., 1862.
Platyglossus semicinctus *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 161.
Hab.—Lower California.

In implying that it was possible that Dr. Ayres might have committed an error in giving the number of dorsal spines of this species, I have done him injustice, since he assures me that he has found that number; although the dentition has not been noticed as to the presence of the angular tooth of the upper jaw, it is doubtless present, and the species probably belong to *Chœrojulis*. The species is unknown to me through specimens.

Subfamily *XYRICHTHYINÆ* Gill.

This subfamily should, perhaps, be limited so as to retain only those types which have the lateral line interrupted. It would then embrace the following genera:

I. Scales rather large, thirty or less along lateral line.
  A. Head with the upper edge trenchant.
    a. Dorsal spine nine, the first two remote from the others, on or close behind the occiput and forming a more or less distinct portion.
      1. Cheeks with small scales..... Novacula.
      2. Cheeks naked†..... Iniistius.
    β. Dorsal spines nine, all connected in a fin whose origin is nearly above the bases of the pectorals. Cheek naked..... Xyrichthys.
  B. Head above bluut.
    1. Dorsal spines connected..... Novaculichthys.
    2. First two dorsal spines more or less detached..... Dimalacocentrus.
II. Scales small (lateral line with about 80). Head blunt on its upper edge..... Cymolutes.

* The *Julis modestus* Grd. of Upper California is the type of a new genus, which may be named *Oxyjulis*. Girard was correct in giving nine dorsal spines; in the one formerly noticed by me and which I caused to be figured, there were, however, only eight.
† Occasionally there are a few scales around the orbit.

The limits of those genera, it may not be unnecessary to remark, were intended to include the same species referred to Bleeker's genera, founded on the same types. Xirichthys embracing *X. novacula*, Cuv., *X. argentimaculata* Steind., (*Nov.*) *Javanica* Blkr., *X. cyanifrons* C. V., *X. martinicensis* C. V., *X. uniocellata* C. V., *X. lineata* C. V. and *X. mundiceps* Gill. Iniistius includes only the *I. pavo*, *I.* (*Nov.*) *tetrazona* ex Blkr., *I. mundicorpus* Gill, *I.* (*Xir.*) *dea* ex T. S. and *I.* (*Nov.*) *aneitensis* ex Gthr. To Novacula are referrible the *N. pentadactyla*, *N. punctulata*, *N. Twistii*, *N. melanopus* and *N. spilonotus*, and probably *N. bimaculata* ex Rüpp. The genus *Iniistius* would not include the *Novaculichthys callosoma* of Bleeker, but at the same time I would not have included it in *Novaculichthys* as it differs not only in the notch between its two produced anterior rays and the third, but also in the still more anterior insertion of the ventral fins; it may be called *Dimalacocentrus callosoma.*

Genus XYRICHTHYS Cuvier, 1815.

Novacula *Bleeker*, 1862, (nec *C. V.*) *Cuv.* R. A. ii. p. 265, 1817.

The genus "*Xyrichthys*" was especially established upon the *Coryphæna novacula* of Linnæus, by Cuvier, in his Memoir on the Fishes of the Mediteranean.* The name must consequently be retained for the genus of which that is the type.

Xyrichthys mundiceps Gill.

Xirichthys mundiceps *Gill*, Proc. Acad. Nat. Sci. Phila., 1862, p. 143.
Novacula mundiceps *Günther*, Çat. iv. p. 172.
Hab.—Cape St. Lucas.

Genus INIISTIUS Gill.

Xirichthys *Bleeker* (nec Cuv. 1815.)

The genus was first recognized by Dr. Bleeker, as now limited, slightly before it was named by the present author, but that gentleman has given to it a name which was originally applied to an allied genus for which it should apparently be retained.

Iniistius mundicorpus Gill.

Iniistius mundicorpus *Gill*, Proc. Acad. Nat. Sci. Phila., 1862, p. 145.
Novacula mundicorpus *Gthr.*, Cat. iv. p. 176.
Hab.—Cape St. Lucas.

Synopsis of the family of LEPTUROIDS, and Description of a remarkable new generic type.

BY THEODORE GILL.

My valued correspondent, M. Felipe Poey, of the University of Havana, in a recent transmission of specimens of natural history to the Smithsonian Institution, forwarded a most interesting fish belonging to the family of Lepturoids, and evidently most closely related to the genus *Lepidopus*. That gentleman, in a previous letter, had drawn my attention to it, and desired me to describe it. This request, so much in accordance with my own inclinations, is now responded to, and, at the same time, in order to illustrate its affinities and differential characters, the diagnoses of the previously known genera of *Lepturinæ* and *Lepidopodinæ* are submitted.

Family *LEPTUROIDÆ* Gill.

Synonymy.

Trichiurini *Rafinesque*, Indice d'Ittiologia Siciliana, p. 37, 1810.

* Memoires du Mus. d'Hist. Nat., i. pp. 324, 329, 1815.

Teniosomes *Blainville*, Journal de Physique, t. lxxxiii. p. 25, 1816.
Trichiuridæ *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 342.
Lepturoidæ *Gill*, Catalogue of the Fishes of the Eastern Coast of North America, &c., p. 35.
Peropteres pt. *Dum.*

Elongated riband-shaped fishes, with the tail very slender, either filiform and finless, or with a forked caudal; a naked skin; maxillars not protractile, more or less coalescent and hiding mostly under the suborbital bones, the post-anal region with numerous, almost concealed spines, and the ventral fins obsolete or represented by scale-like spines behind the pectoral region.

The Lepturinæ and Lepidopodinæ have the most anterior spines simple, but becoming gradually grooved on their posterior edges, and soon the spines themselves are split to their bases.

The following genera belong to this family:

Conspectus

I. Dorsal fin undivided.
  A. Tail filiform and finless..... ..... LEPTURINÆ.
    a. Lateral line near the abdomen.. ..... Lepturus.
    β. Lateral line median..... Eupleurogrammus.
  B. Tail with a normally developed and forked fin..... LEPIDOPODINÆ.
    a. Profile rectilinear and forehead depressed..... Lepidopus.
    β. Profile high, trenchant and boldly declining..... Evoxymetopon.
II. Dorsal fin double..... APHANOPODINÆ.
  Teeth of the palate wanting..... .... Aphanopus.

Aphanopus Lowe is only known to me through the descriptions of Lowe and Günther, which leave considerable to be desired. I am, therefore, precluded from giving a detailed diagnosis. It is to be hoped that some of the Madeiran ichthyologists will more fully illustrate that singular type.

Subfamily *LEPTURINÆ* Gill.

Synonymy.

Trichiuria *Rafinesque*, Analyse de la Nature, &c., 1815.
Trichiurini *Bonaparte*, Systema Vertebratorum, 1831.
Trichiurinæ *Swainson*, Natural History of Fishes, Amphibians and Reptiles, vol. ii. p. 254, 1839.
Lepturinæ *Gill*, Catalogue of the Fishes of the Eastern Coast of North America, p. 35, 1860.

Genus LEPTURUS Artedi.

Synonymy.

Lepturus *Artedi*, Descriptiones Specierum Piscium, p. 111, 1738.
Enchelyopus *Klein*, Historiæ Piscium Naturalis promovendæ Missus quartus, p. 51, 1744.
Gymnogaster *Gronovius*, Museum Ichthyologicum, i. p. 17, 1754.
Trichiurus *Linnæus*, Systema Naturæ, ed. 10, vol. i. p. 429.
Trichiurus *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 346, 1860.
Enchelyopus *Bleeker*.

Body naked, very long and thin, rather rapidly decreasing in its posterior half and terminating in the slender, compressed, finless caudal filament.

Lateral line simple, strongly decurved behind the pectoral fin and continued near the line of the abdomen to its extremity.

Head much compressed, oblong, conic, with the profile straight or incurved and the snout terminating acutely and more or less gibbous near its end. Forehead with an elongated linear depression, bounded on each side by a

ridge of the frontal bone. Eyes moderate, nearly in the middle of the head. Operculum oblong, striated and fringed behind, extending above the bases of the pectoral fins. Nostrils vertical, in front of eyes.

Mouth rather large, the supramaxillars extending partially under the eyes; intermaxillars and supramaxillars united; supramaxillars convex above at the middle, behind with a projection downwards truncated in front. Lower jaw narrow and produced at its chin.

Teeth, one or two on each side of the intermaxillars elongated and barbed; behind smaller, compressed and triangular; smaller in the lower jaw and minute on the palatine bones.

Dorsal fin continuous from the nape and nearly above the preoperculum to the filamentous tail, nearly uniform or higher towards the middle. Anal spines very minute.

Ventral fins entirely absent.

D. CXII.—CXL.

Vertebræ 39 | 112 pm.

Cæca pylorica 24 pm.

This genus is represented in all the tropical seas, except perhaps the African ones, and some of its members wander into the temperate ones, species occuring along the Eastern American coast, as well as the Japanese and Chinese seas. The following five species are well determined:

1. Lepturus argenteus = Trichiurus lepturus *C.* et *V.* viii. p. 237.
   Western Atlantic.
2. Lepturus japonicus = Trichiurus japonicus *Blkr.*
   Japan.
3. Lepturus savala = Trichurus savala *C.* et *V.* viii. p. 251, pl. 224.
   East Indian and Chinese seas.
4. Lepturus haumela = Trichiurus haumela *C.* et *V.* viii. p. 249.
   East Indian seas.
5. Lepturus lajor = Trichiurus lajor *Blkr.*
   Manado.

Genus EUPLEUROGRAMMUS Gill.

Synonymy.

Eupleurogrammus *Gill*, Proc. Academy of Natural Sciences of Phila., 1862.
Trichiurus sp. *Gray*, *Günther*.

Body naked, very long and thin, rather rapidly decreasing at its posterior half and terminating in the slender, compressed, finless caudal filament.

Lateral line simple, scarcely decurved, and continued along the middle of the side to its termination.

Head much compressed, oblong conic, with the profile nearly straight, the forehead transversely convex, the snout acute and scarcely gibbous near its end. Eyes rather large, situated nearly in the middle of the head. Operculum oblong and fringed behind, extending above the base of the pectoral fins. Nostrils vertical, in front of the eyes.

Mouth as in *Lepturus*.

Teeth as in *Lepturus*.

Dorsal fin continuous from the nape nearly above the preoperculum to the extremity of the tail, where the spines are very minute. Anal spines very minute.

Pectoral fins longest at the upper rays, obliquely subtruncated below.

Ventral fins replaced by a pair of minute scale-like spines.

D. CL. pm.

Type. Eupleurogrammus muticus *Gill* ex *Gray*.

This genus differs from *Lepturus* chiefly by the course of the lateral line along the middle of the body,—the feature indicated by the generic name,—and

also by the presence of scale-like spines in place of the ventrals. It thus shows a tendency towards *Lepidopus*, and perhaps further by a more perfect development of the tail than occurs in *Lepturus*.

According to Günther, the *Trichiurus muticus* and *T. intermedius* of Gray are not specifically distinct, and, if this opinion is correct, the typical species of the genus is the only one known. Both forms inhabit the East Indian and Chinese seas.

Subfamily *LEPIDOPODINÆ* Gill.

Genus LEPIDOPUS Gouan.

Synonymy.

Lepidopus *Gouan*, Historia Piscium, p. 185, 1770.
Vandellius *Shaw*, General Zoology, vol. iv. p. 199, 1803.
Scarcina *Rafinesque*, Caratteri di alcuni Nuovi Generi, &c., della Sicilia, p. 20, 1810.
Zipotheca *Montagu*, Memoirs of the Wernerian Society, vol. i. p. 81, (1809), 1811.
Lepidopus *Cuv.*, *Günther*, et al.

Body naked, very long and thin, gradually decreasing backwards till within a short distance of its extremity, when it rapidly tapers into a slender compressed caudal peduncle, on which is set a small, but completely developed, caudal fin. Anus subcentral.

Lateral line simple, little decurved from the scapular region and continued along the middle of the side to its end.

Head much compressed, oblong, conic, with the profile nearly straight or constricted behind the forehead, and with the snout gibbous near its end; forehead narrow, with an elongated triangular depression between two frontal ridges. Eyes moderate, situated nearly in the middle of the head. Operculum oblong, not extending as far back as the bases of pectoral fins, fimbriated on its margin. Nostrils oblique, in front of the eyes.

Mouth moderate, the supramaxillars extending to about the vertical from the front of the eye; intermaxillars and supramaxillars free, the former highest near the middle and arched above, again widened towards the ends, with a terminal expansion downwards truncated in front. Lower jaw narrowed to its extremity and bluntly produced at the chin.

Teeth, two or three long, simple, (or barbed ?), compressed ones on each side of the intermaxillars in front,* and behind a row of small ones. Lower jaw with a similar row ; palatine teeth minute.

Dorsal fin commencing above or behind the preoperculum, nearly uniformly high and continuous almost to the caudal fin. Anal spines numerous and minute ; behind enlarged and connected by a membrane to form a fin.

Caudal fin small but normally developed, deeply forked, and with subacute lobes.

Pectoral fins inserted almost horizontally, with the lower rays longest, and above emarginated.

Ventral fins represented by scale-like spines inserted behind the pectoral fins.

D. C—CV. A. XX—XXV.

Vertebræ 41 | 71 pm.

Cæca pylorica 23 pm.

Type. Lepidopus caudatus *White* ex *Euphrasen*.

Only one species of this appears to be known. It has been only found in the Mediterranean Sea and the eastern parts of the Atlantic Ocean.

Genus EVOXYMETOPON Poey.

Body naked, very long and thin, very gradually decreasing backwards till within a short distance of the extremity, when it more rapidly tapers into a

* I see none with barbed points, like those represented by Cuvier, in the specimen before me.

slender compressed caudal peduncle, on which is inserted a completely developed caudal fin. Anus submedian.

Lateral line simple, scarcely decurved from the scapular region, and continuous along the middle of the side to its end.

Head much compressed, oblong, with the profile regularly decurved from the nape or supraocular region to the snout, the occiput and forehead being trenchant and elevated. Eyes moderate or rather large, subcircular, and situated chiefly in the anterior half of the head. Operculum oblong, trapezoidal, not extending backwards as far as the pectoral fins, radiatedly striated on the surface, and giving a fringed margin to the bone above its angle. Nostril subcircular, in front of the eye.

Mouth moderate, the supramaxillars extending only to about the vertical of the front of the eye; intermaxillars and supramaxillars free, the latter highest towards the middle, where they are arched above, thence constricted and little widened towards the ends, with a terminal extension downwards abruptly truncated in front. Lower jaw deeply narrowed towards the symphysis, where it is moderately deep, and with the chin obtusely angulated.

Teeth—two or three strong, simple, compressed, recurved ones on each of the intermaxillars in front, and behind a row of small ones. Lower jaw with a row of nearly similar but straighter teeth. The palatines have a minute row, and, finally, the tongue is armed also with minute ones on the lateral margins.

Dorsal fin commencing nearly over the eye, slowly decreasing in a continuous line towards the caudal fin. Anal spines numerous, preceded by a dagger-shaped spine behind the anus; the spines mostly minute, free, posteriorly enlarged, connected by the membrane and forming a fin.

Caudal fin small, but normally developed, deeply forked and with subacute lobes.

Pectoral fins inserted almost horizontally, with the lowest rays longest and the border of the fins above them emarginated.

Ventral fins represented by short broad scales behind the pectoral region.

This genus is at once distinguished from *Lepidopus* by the form of the head, the origin of the dorsal fin, and the obtusely angular chin and the consequent ascent of the jaw forwards to the symphysis above. It is at present only certainly known as a West Indian type, but it is probable that a representative of it has wandered to the British shores, and been noticed under the name of *Trichiurus lepturus*.

EVOXYMETOPON TÆNIATUS Poey.

The greatest height equals about a twelfth of the extreme length, while the head forms about an eighth of the same. The head is oblong, trenchant above, elevated above the eyes for a space considerably greater than the diameter of the eye, and decurved very obliquely downwards to the snout. The diameter of the orbit enters about six times in the head's length. The first ten dorsal spines are undivided; the rest split.

B. 7. D. 87. A. 19. C. 17. P. 12.

The color is silvery, with about six narrow reddish bands most distinct behind, the first on the ridge of the back and the fifth along the lateral line.

One specimen, nearly five feet long, was procured by Prof. Poey, and has been kindly presented to the Smithsonian Institution. Is not this at least closely related to the fish found on the beach of the "Moray Frith, near the fishing village of Port Gordon," about three miles east from the mouth of the river Spey, "on the 12th of November, 1812," and noticed by Mr. James Hoy?* The specimen was referred by Hoy to the *Trichiurus lepturus*, but it

* For a notice of this fish, see the Transactions of the Linnean Society of Scotland, vol. xi. p. 210, and Yarrell's History of British Fishes, ed. 2, vol. i. p. 206.

evidently did not belong to that species, as the body gradually diminished for the latter half "to the tail, which ended in a blunt point;" the "dorsal fin extended from the head to the tail;" "both sides of the fish were white, with four *longitudinal bars of a darker color;* the one immediately below the dorsal fin was about two inches broad, each of the other three about three-fourths of an inch. The side line straight along the middle." "Its head had been broken off and quite gone."

In all the points thus enumerated, the Scotch fish decidedly differs from the species of the genus *Lepturus*, and it is equally distinguished from the *Lepidopus caudatus* by its bars of color, the latter, like *Lepturus*, having uniform silvery sides. It is true that Hoy denies ventral and anal fins, but it must be remembered that he was not a scientific ichthyologist; the ventral scales, as well as the anal fin, had also, perhaps, been lost, or, preoccupied with the idea that his fish was the *Lepturus*; Hoy did not carefully look for them. But whether this hypothesis is right or wrong, it is evident that Hoy had neither a *Lepturus* nor *Lepidopus* before him, and another large species of the sea remains to be confirmed by British naturalists as a visitant to their waters. The third edition of Yarrell's work is unknown to me, but its rediscovery can scarcely be signalized in it, since no mention is made of it in the subsequent work of Günther.

The following table indicates the relative proportions of the *Evoxymetopon taeniatus*.

Extreme length 100.

Body—Greatest height 8; Height at anus $6\frac{1}{4}$; height of tail between anus and caudal fin 5; least height of tail $\frac{1}{2}$.

Head—Greatest length 12; distance from snout to nape 7; length of snout $4\frac{1}{4}$; length of operculum $4\frac{1}{2}$; length of lower jaw 5.

Orbit—Diameter 2; distance from profile $2\frac{1}{2}$.

Dorsal—Height at first spine 3; height at second spine $3\frac{3}{4}$; height at ray above anus $1\frac{3}{4}$; height at ray between anus and caudal $1\frac{1}{4}$.

Caudal—Length of external rays $3\frac{1}{4}$.

Pectoral—Distance from snout at upper axilla 14; length $6\frac{1}{4}$.

Ventral—Distance from snout $17\frac{1}{2}$; length $2\frac{3}{4}$.

Synopsis of the North American GADOID FISHES.

BY THEODORE GILL.

In this paper I have corrected some errors that were copied in the "Catalogue of the Fishes of North America," and an endeavor has been made to distribute the species, approximately at least, among their natural groups and genera. The whole family yet requires a careful revision, and the chief points to be cleared are rather referred to and indicated than elucidated. May those who are more fortunately situated carefully elaborate the subject!

I. Caudal fin distinct. Lateral line continuous.

A. Anterior dorsal fin developed as a true and separate fin.

B. Ventral fins normally developed, with (3—) five to seven rays.

1. Posterior dorsal, as well as anal, sinuated or emarginated behind middle. Vertebræ with their neural spines developed, and wedged one into the other. Frontal bones double..... MERLUCINÆ.

* Teeth of inner row elongated, moveable..... Merlucius.

2. Posterior dorsal and anal fins double. Vertebræ with moderate neural spines .. .. GADINÆ.

a. Lower jaw longer. Barbel absent or rudimentary. ....

* Teeth of upper jaw of equal size..... Pollachius.

** Teeth of upper jaw enlarged in the outer row. Boreogadus.
β. Lower jaw shorter, received within the upper.
* Head oblong conic and pointed; the snout at least twice as long as the eye. Chin barbel well developed.
† Anterior dorsal little elevated. Mouth moderate, maxillary extending at least as far as front of orbit. Gadus.
†† Anterior dorsal elevated at angle. Mouth small, the maxillary not extending as far as orbit. Melanogrammus.
** Head abbreviated; the snout blunt and little or no longer than the eye Brachygadus.
3. Posterior dorsal and anal fins entire and even. Lotinæ.
* Anterior dorsal fin anterior, little behind the pectorals. Mandible and vomer with enlarged teeth Molva.
BB. Ventral fins simple at their base, thence divided. Phycinæ.
* First dorsal fin produced at third ray. Caudal fin convex behind. Phycis.
** First dorsal fin rounded and not elevated. Caudal emarginated Urophycis.
AA. Anterior dorsal fin composed of small fringes preceded by a slender ray Ciliatinæ.
* Head depressed behind.
α. Snout without cirrus Onos.
β. Snout with cirrus Rhinonemus.
** Head compressed Ciliata.
AAA. Dorsal fin single and extending on back Brosminæ.
* Chin with a single barbel Brosmius.

Subfamily MERLUCIINÆ Gill.

Genus MERLUCIUS Raf.

Onus *Raf.*, 1810.
Stomodon *Mitchill*, 1814.
Hydronus *Mindling*, 1832.
Merlus *Gay*.
Homalopomus *Girard*.
Epicopus *Günther*.

In North American waters are perhaps found two species of this genus occupying different areas: one, identified with the European species, inhabiting the seas of Greenland, and the *Merlucius bilinearis* occurring in more Southern latitudes.

Merlucius vulgaris Fleming.

Gadus merluccius *Linn.*
Merluccius borealis *Swainson.*
Hab.—Greenland.

I retain the name of Fleming for this species since there appears to be some doubt whether the one of the Mediterranean Sea and neighboring ocean is not different. I have never seen the Greenland species, and therefore am in no position to either confirm or contest its identification, which, however, is vouched for by the able Reinhardt.

Merlucius bilinearis Gill.

Stomodon bilinearis *Mitchill*, Rep., p. 7, 1814.
Gadus merlucius *Mit.*
Gadus albidus *Mit.*, Journ. Acad. N. S. Pa., i. p. 409.

[Sept.

Merlucius vulgaris *Storer*, Rep., p. 132.
Merlucius albidus *Dekay*, Rep., p. 280, pl. 46, f. 148.
Merlucius bilinearis *Gill*, Cat.

Hab.—Eastern coast from Virginia northwards.

This species appears to differ from the European hake by the more numerous rays of the first dorsal, the more depressed second dorsal and anal, and in its proportions. The number of rays given to the European species by some of the best zoologists is exhibited in comparison with that presented by the American species.

M. vulgaris.

D. 9—10 | 39—40	A. 37—39	Linnæus.
D. 9 | 40	A. 39	Pennant.
D. 10—11 | 37—39	A. 37—38	Sundevall.
D. 10 | 39	A. 37	Parnell.
D. 9-10 | 39-40	A. 39—40	Kroyer.
D. 10 |	A. 39—40	Nilsson.
D. 10 | 36—37	A. 39—40	Günther.

M. bilinearis.

D. 12 | 39	A. 39	Mitch. Rep.
D. 12 | 38	A. 41	" Trans. N. Y.
D. 12 | 38--41	A. 40	Storer R. & Syn.
D. 11 | 39	A. 40	Dekay.
D. 13 | 41	A. 40	Storer Mem. Ac. vi.
D. 12 | 39 (*d.* 19)	A. 39	Gill.
D. 13 | 38 (*d.* 17)	A. 39	Gill.
D. 12 | 41 (*d.* 20)	A. 41	Gill.

From the above enumeration, it is evident that the difference in the number of the rays of the first dorsal does not come within the limits of specific variation. The depression of the second dorsal occurs at the seventeenth to twentieth rays. The number of rays of the first dorsal has been verified in eight other individuals.

Subfamily *GADINÆ* (Bon.) Gill.

Genus POLLACHIUS (Nilsson.)

This genus does not appear to include more than one American species, which one has been considered to be identical with the European *Pollachius carbonarius* by those who have compared the two. The *Merlangus poutassou* of Risso, referred to this genus by Nilsson and Bonaparte, is quite distinct from it and the type of one which, having received no special name, may now be designated *Micromesistius;* it is distinguished by its dentition, the very short abdomen, very long first anal and short second dorsal, which is widely separated from the first and third.

POLLACHIUS CARBONARIUS Bon.

Synonymy of American fish.

Gadus purpureus *Mitch.*
Gadus (Merlangus) carbonarius *Rich.*, F. B. A., iii. p. 247.
Merlangus carbonarius *Storer*, Rep., 129.
" purpureus *Storer*, Rep., 130.
Pollachius carbonarius *Gill*, Cat., p. 48.
Merlangus purpureus *Gill*, Cat., p. 48.
Gadus virens *Günther*, iv. 339.

Doubtful synonymy.

Merlangus leptocephalus *Dekay*, Rep., p. 288, pl. 45, f. 146, (rectius 147 ?)

I am acquainted with only one American species of this genus; it is undoubtedly the same described and figured by Storer in his History of the Fishes of Massachusetts, and the same as that which has been referred to the *Gadus virens*, or *Pollachius carbonarius*, by Dr. Günther. As that gentleman has identified it with the European species after an actual comparison of specimens from Boston and Europe, and, as Dr. Reinhardt has enumerated the European species among the Greenland Fishes, I am forced to follow them in faith until I shall be able to examine myself the fishes of the several countries.

I am, however, disposed to believe that the New England and New York type is a distinct species; in that case, it must receive the name *Pollachius purpureus;* the minute barbel is very often present.

Dr. Storer, in 1839, believed that he could recognize two species of *Merlangus* of the *M. carbonarius* type, one of which was called by the last name and the other designated as *M. purpureus*, Mitchill. In his descriptions he has given each a special set of characters, some of which are not mentioned in the description of the allied species, but, as his notices are not comparative, it cannot be assumed that the characters attributed to one are wanting in the other when not mentioned. But even after the eliminations required by such considerations, some points of his descriptions may be contrasted, and if implicitly relied in, would result in the admission of two species. Of *M. carbonarius*, he describes the "length of the head compared to that of the body, exclusive of the tail, as 1 to $2\frac{1}{4}$; depth of the body over the base of the pectorals rather less than the length of the head," while to *M. purpureus* is only attributed "a depth of the body across from the anus exclusive of the dorsal fin, as 1 to 4;" "length of the head about equal to the greatest depth of body;" the first dorsal fin of *M. carbonarius* is "longer than high;" in *M. purpureus*, a "third longer than high."

With regard to the proportions of the head and body of *M. carbonarius*, there can be no question that there has been error, for a length equal to two and a quarter times that of the head would nearly extend to the middle of the first anal,—proportions which the *M. carbonarius* of Europe certainly does not exhibit, and which, as subsequent evidence demonstrates, the *M. carbonarius* of Storer equally fails to show. The length of the first dorsal is exceptionally if ever a third longer than high. The other variations between *M. carbonarius* and *M. purpureus* are very slight, and no true specific characters are brought forward; and, as Storer has only admitted a single species in his last work on the Fishes of Massachusetts, there can "be little question that there is no specific difference between the two."

Dekay, subsequently, in his "Zoology of New York" admitted three species,—the *M. carbonarius* and *M. purpureus*, as well as a new species, which he called *M. leptocephalus*, distinguished by having the "*lower jaw shortest*," and of which he further says, "*the upper jaw receives the under jaw within it, although, when extended, the latter appears somewhat the longest;*" "the first dorsal pointed." His descriptions are, as usual, loose and vague, but, with the exception of the portions quoted above, contain nothing which would decidedly be opposed to their reference to the *M. carbonarius*, and if it is assumed, as from analogy would almost be justified, that the *M. leptocephalus* was founded on a specimen in which the lower jaw had been retracted by dislocation, they may with little hesitation be referred to one species.

In my Catalogue of the Fishes of the Coast, failing to exercise sufficient criticism, I have admitted the three species of Dekay and Storer's Synopsis, retaining the *M. purpureus* and *leptocephalus* in *Merlangus*, the latter being expressly said to have the lower jaw shortest, and Dekay's figure of *M. purpureus* representing the lower jaw still shorter,* (although opposed to his de-

* Have not Dekay's figures of *M. purpureus* and *M. leptocephalus* been reversed?

scription), while with Bonaparte the genus *Pollachius* has been accepted for *M. carbonarius*. I shall not attempt any justification of this error, as it undoubtedly is, for I myself entertain no doubt that all of the preceding names are referrible to one and the same species. Evidently the *M. leptocephalus* has no affinity to the true *Merlangi*.

In a moderately large specimen, the height is contained about 5 times in the extreme length, and $4\frac{2}{3}$ times to the point of the caudal peduncle; the head $4\frac{1}{2}$ times in the former, and 4 times in the latter. The first dorsal is about as high or higher than long and about two-thirds shorter than the second. The rays are indicated in the following formula:

D. (12--) 13 | 18—21 | 19—21. A. (21) 24—27 | 18-20.

Genus BOREOGADUS Günther.

Boreogadus polaris Gill.

Gadus æglifinus *Fab.*, Fauna Groenl., p. 142.
Merlangus polaris *Sabine*, App. Parry's Voyages, p. ccxi. 1824.
Gadus Fabricii *Rich.*, F. B. A., p. 245; *Gthr.*, iv. p. 336.
Gadus polaris *Rich.*, F. B. A., p. 247.
Gadus agilis *Reinh.*, Vid. Selks. Afh., vii. p. 126.
Pollachius polaris *Gill*, Cat., p. 48.

Hab.—Greenland and Polar seas.

Dr. Günther has placed this species in a section of his genus *Gadus* named *Boreogadus*, and characterized by having the lower jaw longest; teeth in the outer series of the upper jaw stronger than the others. To it were referred the *Gadus fabricii* of Richardson (*B. polaris*), *G. Esmarkii* Nilsson, the *Merlangus productus* of Ayres, which belongs to the subfamily of Merluciinæ, and has not the characters of the section; and, lastly, the *Gadus poutassou* of Risso which is the type of the genus *Brachymesistius*. The *Merlangus polaris*, however, is the type of a genus distinct from *Pollachius* and departs from that genus in its larger mouth, enlarged teeth of the outer row in the upper jaw, the extension forwards of the branchial aperture above, obsolescence of the lateral line behind and form of the pectoral fins. The single specimen which I have seen has also the caudal fin unequally lobed, the upper lobe narrowed and rounded behind, the lower triangular and angular; it is possible, however, that the peculiarity may not be normal, as no mention has been made of it by others.

Genus GADUS (Artedi) Bon.

Morrhua *Cuv.*

This genus, as now restricted, excludes the common Haddock and the *Gadus minutus* of Linnæus, the former of which is taken as the type of the genus *Melanogrammus* and the latter as that of the genus *Brachygadus*. The American species of *Gadus* have been involved in considerable confusion. There are two very distinct species found along the Eastern coast northwards to Hudson's Bay. One of these is at least nearly allied to the common cod of Europe, and has been known among modern American naturalists under the name of *Morrhua americana;* the second is the "tom cod" or "frost fish" of the people, and is quite distinct from any European species.

In addition to these, two other species have been attributed to America, both being inhabitants of the Greenland seas; one has been identified with the European cod, and the other has been named *Gadus ojac* and *ovak* by Richardson and Reinhardt, while by Günther it has been considered as a variety of the common cod.

Finally, Günther, on the authority of Mitchill, identifying the *Gadus morrhua* of that author with its Linnæan homonym, while referring the same author's *G. callarias* to the synonymy of *G. tomcodus*, has stated the true *G. morrhua* to be found southwards to New York.

Having never seen any of the Greenland *Gadi*, I am unprepared to form an opinion of their distinction from each other or from the common cod of the more Southern American coast. I am, however, disposed to believe that Reinhardt has been able to find good characters for his *G. ovak*, while the cod of New England, the Gulf of St. Lawrence and Hudson's Bay appears to differ slightly from that of Europe by the proportions of the fins.

The specific differences between three of the species herein provisionally admitted remain to be confirmed.

GADUS MORRHUA Linn.

Gadus callarias *Linn.* (Young.)
Gadus callarias var. a. *Fabr.*
Morrhua vulgaris *Flem.*
Morrhua callarias *Cuv.*
Gadus morchua *Reinhardt.*
Hab.—Greenland fide Reinhardt.

GADUS OJAC Richardson.

Gadus barbatus *Fabricius* (nec. *Linn.*)
Gadus ovak *Reinhardt.*
Morrhua ojac *Storer.*
Hab.—Greenland.

GADUS ARENOSUS Mitchill.

Gadus morrhua *Mitchill*, Am. Med. and Phil. Reg., vol. iv. 1814, p. 620.
Gadus callarias *Mitchill*, op. cit., pp. 620, 621.
b. Gadus arenosus " " "
c. Gadus rupestris " " "
Morrhua americana *Storer*, Rep., p. 120.
Gadus americanus *Gill*, Cat., p. 48.
Gadus morrhua pt. *Günther*, iv. p. 328.

The anus is under the first rays of the second dorsal fin, and is little nearer the snout than the point of the caudal peduncle. The first anal fin is quite or nearly half as long again as the first dorsal, about as long as the second, and about a fifth or fourth longer than the second anal. The supramaxillar ceases nearly at the vertical of the front of the pupil. The posterior nostril has an elevated margin. There are numerous minute pores on the head, on each side, six above the supramaxillar bones, the first linear and very near the margin of the snout, and four or five below and behind the eye ; six or seven on each branch of the lower jaw, five along the margin of the preoperculum, five in the oculo-scapular groove, including the one above the angle of the branchial aperture, one between the anterior nostril and snout, one obliquely above the posterior nostril, and two on the nape above the second and third of the oculo-scapular groove. The caudal fin is slightly emarginated behind.

The proportion of the fins to each other are as follows, the fractions indicating the number of hundredths of the total length ; the proportions of the same fins in *Gadus morrhua*, the first dorsal considered as the unit, are taken from Günther, and copied on the second line :

1st. D.	2 D.	3 D.	1 A.	2 A.
11—12	16—18	13—14	16—18	11—13
1	1.3	1.1	1.2	10.9.

The radial formula is as follows :

D. 13—15 | 19—22 | 19—22. A. 19—22 | 17—19.

The structure of the rays, is indicated in the following formula, where the first and last numbers of each fin refer to the simple articulated rays and the others to the branched or bifurcated :

D. 2. 7. 4 | 2. 12. 3 | 2. 14. 3. A. 2. 14. 3 | 2, 14. 1.

[Sept.

The rays of the specimens, whose measurements are given, are herewith indicated.

N. Foundland	D. 13	22	22	A. 22	20	
Labrador	13	18	19	19	19	
Hudson's Bay	13	17	19	19	17	

The more detailed measurements of these specimens are given in the following table, and are taken from specimens of equal size, scarcely more than a foot long. The first one was obtained by the author at Newfoundland; the second at Labrador, by Dr. Elliott Coues, and exhibits the monstrosity of two barbels, one behind the other; the third was obtained at Hudson's Bay by Mr. Drexler, and has unusually long pectoral and ventral fins. Notwithstanding these deviations of the last two, on account of which they were selected, they nearly agree in most of the measurements.

Extreme length (=100)	12⅓	12½	12½
Body—Greatest height	18	18	15?
Height of tail behind second dorsal fin	12	10	9
Least height of tail	5	4½	4
Length of tail	?	12	11
Head—Greatest length	26	26½	26
Greatest width	12	11½	11½
Width of interocular area	6½	6	6½
Height at nape	15	15	14
Length of snout	8½	9⅓	9
Length of operculum	5	5	5½
Length of supramaxillar	9⅓	10½	11½
Orbit—Diameter	5½	5½	5½
Dorsal (First)—Distance from snout	29	30	31
Length of base	11½	11	12
Greatest height	12	13½	14½
(Second)—Length of base	18	16½	16
Greatest height	10	10	11⅓
(Third)—Length of base	14	13	13
Greatest height	9	10	10⅓
Anal (First)—Distance from snout	45½	47½	47
Length of base	18	15⅔	17½
Height at longest ray	11½	12½	11
Caudal—Length of middle rays	7	7	8
" " external rays	11	11	12
Pectoral—Length	13	13½	16½
Ventral—Length	12	12	15½

GADUS TOMCODUS Walbaum.

Gadus tom-cod *Wallbaum*, Artedi, p. 133, 1792.
Gadus pruinosus *Mitchill*, Rep.
Gadus tomcodus *Mitchill*, Am. Med. and Phil. Reg., iv. 1814, pp. 621, 622.
(*b.*) G. t. *fuscus* " " " " " "
(*c.*) G. t. *luteus* " " " " " "
(*d.*) G. t. *luteo-pallidus* " " " " " "
(*e.*) G. t. *mixtus* " " " " " "
Gadus pruinosus " " " " " "
Gadus polymorphus " " " " " "
Morrhua (tomcodus) *Cuv.*, R. A.
Morrhua tomcodus *Storer*, Rep.
Morrhua prninosa *Dekay*.

The anus is under the last rays of the first dorsal fin and is nearly midway between the snout and the axil of the anal fin. The first anal is about twice as long as the first dorsal, about a third longer than the second, and nearly or

quite twice as long as the second anal. The supramaxillary bone ceases at a vertical drawn nearly midways between the front of the eye and pupil. The pores of the head are obsolete. The caudal fin is convex behind.

Hab.—New York to Newfoundland.

The preceding diagnosis at once distinguishes the "*tom-cod*" or "*frost fish*" of the Americans from the common cod, and, although the distinctive characters may not have been very well indicated in the diagnoses or descriptions of American naturalists, there has been no confusion between them and there has never been difficulty in practically distinguishing them. European naturalists have been less fortunate: Dr. Kaup placing the name of the tom-cod among the synonyms of *Gadus morrhua* and also including under the latter the *Morrhua americana*, while Dr. Günther, although well distinguishing the *Gadus tomcodus*, has been unhappy in the distribution of the synonymy. The *Gadus callarias* of Mitchill is the same as his *Gadus morrhua* and both are identical with *Morrhua americana* of Storer and Dekay; the former and latter names must therefore be withdrawn from the synonymy of *G. tomcodus*, to which they have been referred by Günther, and with the *G. callarias* must be placed at least provisionally as the synonyms of a close analogue of the European cod. The figure of Dekay might have informed naturalists that the *M. americana* was not the same as the "*tom-cod.*" A good figure of the American cod is also given by Dr. Storer in his "History of the Fishes of Massachusetts" in the "Memoirs of the American Academy," (2d ser.) vol. vi. (p. 343) pl. xxvii. fig. 4.

Genus BRACHYGADUS Gill.

Brachygadus *Gill*, Proc. Acad. Nat. Sci., Pa., 1862.
Type. Gadus minutus *L.*

Brachygadus minutus Gill.

Gadus minutus *Linn.*
? Morrhua minuta *Storer*, Reports on the Ichthyology and Herpetology of Mass., p. 127, 1839.
?? Morrhua minuta *Dekay*, Zoology of New York, *Fishes*, p. 277 (fig. 141 altered from Yarrell), 1842.

This species, or even an allied one, has not yet been permanently established as even a visitant of the North American waters. Dr. Storer, in his Report, mentions a single specimen "which was taken in Boston harbor; it has been preserved several years in spirits in the Boston Society of Natural History," and "its colors have undoubtedly somewhat changed." The specimen was "eight inches in length; length of the head two inches; depth of the body across the base of the pectorals rather less than the length of the head;" "snout obtuse;" "a cirrhus one-fourth of an inch long is suspended from the chin;" eye half an inch in diameter, being equal to one-fourth the length of the head; "the pectorals are an inch long." D. 12—19—17. P. 17. V. 6. A. 22—17. C. 20.

Such is the only notice of the existence of the *Brachygadus minutus* on our coast. The description is scarcely reconcilable with the European species; and almost the only character which would indicate that it might not be the young of *Gadus americanus* is the "snout obtuse," but when the "*Morrhua tomcodus*" is said to have the "snout blunt," it may be asked, what is meant by that term? and if there is any difference between the two?

Dekay also inserted the "*Morrhua minuta*" among the fishes of New York, compiling his description from Yarrell and Storer, giving the radial formula of the latter and copying, with alterations, the figure of Yarrell. He finally stated:

"This is a rare species on our coast. I only know it through the description of Dr. Storer, although I think I saw it some years since in the market.

At that time, I supposed it might be the *M. pruinosa*, var. *fusca*, of Dr. Mitchill, but I have now little doubt but that it was the species just described."

Dr. Storer, in his "Synopsis," gave a diagnosis attributing a "depth one-fifth of the length; first dorsal entirely before the first anal;" copying the radial formulæ of Jenyns, Yarrell and himself, giving only "Massachusetts" as its habitat, but admitting Dekay's notice in his synonymy.

In his "History of the Fishes of Massachusetts," he takes no notice whatever of the species, and does not quote his notice among the synonyms of "*Morrhua americana*" or "*M. pruinosa.*"

Finally, in consideration of the uncertainty at least in which the existence of this species as an American fish is concerned, it must be eliminated from the Fauna of the coast until definitely established, and the name of Storer will probably be placed in the synonymy of *Gadus americanus.*

Genus MELANOGRAMMUS Gill.

Melanogrammus *Gill*, Proc. Ac. N. S. Phila., 1862.

The genus *Melanogrammus* is sufficiently distinguished from *Gadus* by its smaller mouth, the produced first dorsal fin, black lateral line and the development of the humerus.

Nilsson* and Bonaparte† have expressly appropriated the Artedian name *Gadus* for the *G. morrhua* and its allies, most judiciously treating the Cuvieran genus *Morrhua* as its synonym, since, as its name indicates, the latter was intended to embrace the common cod as its type; the *G. æglifinus* at the same time was removed from the genus and referred to the genus *Merlangus*, which was differently limited and otherwise defined than by Cuvier. Finally, perceiving that it was not a true *Merlangus*, and agreeing with Nilsson, Kroyer and Bonaparte in its separation from *Gadus*, I have, in an article published in the Proceedings of the Academy of Natural Sciences, for June, 1862, distinguished it under the generic name *Melanogrammus*, which must be, of course, retained by those who consider the genus a valid one.

Melanogrammus æglifinus Gill.

Gadus æglifinus *Mitchill.*
Morrhua æglifinus *Storer.*

Hab.—Eastern coast from New York northwards.

I have been unable to compare this American fish with the European species, and before considering the identification definite, a careful comparison is necessary, especially since it has not been found in Greenland.

Subfamily *PHYCINÆ* (Sw.) Gill.

Genus PHYCIS Raf.

There are specimens of two very distinct species of the restricted genus *Phycis* in the collection of the Smithsonian Institution, and to those two I am inclined to refer all the names given by authors to the American specimens. Concerning the nomenclature of the two, there is as usual some confusion. This I shall endeavor at least in part to dissipate.

Phycis chuss Gill.

Blennius (chuss in New York) *Schœpf*, Ges. Nat. F. zu Berlin, viii. p. 143, 1788.
Blennius chuss *Walbaum*, p. 186, 1792.
Enchelyopus americanus *Schn.*, *Bl.*, p. 53.
Gadus longipes *Mitch.* op., cit., iv.
Phycis (americanus) *Cuv.*, R. A., 1817, ii. 217.

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* *Nilsson*, Prodromus Ichthyologiæ Scandinavicæ, 1832, pp. 39, 41.
† *Bonaparte*, Catalogo Metodico dei Pesci Europei, 1846, p. 45.

Phycis americanus *Dekay*, Rep., 291, f. 159.
Phycis americanus pt. *Storer*, Sys., 221.
Phycis tinca *Kaup*, Arc. f. Nat., 1858, i. 89.
Phycis filamentosus *Storer*.

The height at the anus enters about $6\frac{3}{4}$ times in the extreme length and 6 times exclusive of the caudal fin; the head more than 5 times in the former or $4\frac{1}{2}$ in the latter. The supramaxillar bones end under the posterior margin of the pupils. The snout is longer than the eye and forms a quarter of the head's length. The width of the interorbital space exceeds the vertical diameter of the orbit.

The vent is nearly under the tenth ray of the second dorsal, generally intermediate between the snout and about the end of the fourth or fifth of the anal fin. The elongated third dorsal ray is generally shorter than the head. The pectoral enters about $1\frac{1}{3}$ times in the head's length. The ventral is more than a half larger than the head and extends behind the vent.

The scales are very distinct, in about 110 oblique rows from the scapular region to the end of the caudal peduncle, and in nine rows between the first dorsal and the lateral line.

D. 9 | 57. A. 50.

The color of the body and fins is yellowish-brown, thickly punctulated with darker. The anal has its rays tipped with white, by which a whitish linear margin is produced. The roof of the mouth and most of the tongue is dark purple.

The first notice of this species appears to have been given in Schœpf's Descriptions of some North American Fishes, published in 1788. He there describes a fish under the generic name of *Blennius*, which, according to him, was called "*chuss*" at New York. The color was reddish-brown on the head and back, white beneath; in a specimen eighteen inches, the shorter branch of the ventral ray was $2\frac{1}{2}$, and the other 5 inches long; the first dorsal had nine rays, of which the first (truly third) was filiform and four inches long; the second dorsal had 60 rays, and the anal 53; the scales were deciduous.

This decription was paraphrased from the German, except in the important notice of the proportions of the ventral fins, by Walbaum in his edition of Artedi, and he was the first to confer a specific name—*Blennius chuss*—on it.

Mitchill, in 1814, under the name of *Gadus longpipes*, gave a recognizable description of it based on a specimen having the "length about twenty inches; depth three and a half: the first (third) ray of the first dorsal almost six inches long." Allusion was made to the "sides of the tongue and inside of the throat smutty or dotted with black." "The ventral fins (were) six inches long, bifid, tapering and reddish."

Storer, in his, "Report on the Fishes of Massachusetts," has confounded this species with another, for which he has retained the name of *P. americanus*. In his "Synopsis of the Fishes of North America," he has repeated his error, citing the description and figure given by Dekay of the present; but his description in the latter work was so vague that I was not aware of it till the publication of his History.

Finally, in his "History of the Fishes of Massachusetts," Storer has described and figured the present species under the new name of *Phycis filmentosus*, while the *P. americanus* proves to be quite different from that on which the latter name was originally conferred.

Phycis tenuis Dekay.

Phycis furcatus *Storer*, Boston Journ. N. H., i. 418 (excl. syn.)
Phycis americanus *Storer*, Rep., p. 138 (excl. syn.)

Doubtful synonymy.

Gadus tenuis *Mitch.*
Phycis tenuis *Storer*, Syn., 222.
Phycis Dekayi *Kaup*, Archiv. f. Nat., 1858, i. p. 89.

The height at the anus enters nearly six times in the extreme length, and five times to the rudimentary caudal rays; the head about $4\frac{1}{2}$—$4\frac{3}{4}$ in the former, and 4—$4\frac{1}{3}$ without the caudal. The supramaxillar bones end under the posterior margin of orbit. The snout is longer than the eye, and forms a fourth of the head's length. The width of the interorbital space equals the vertical diameter of the eye. The snout is narrower and more pointed than in *P. chuss*.

The anus is under the ninth to the eleventh rays of the second dorsal fin, and is nearly intermediate between the snout and constricted portion of caudal peduncle. The elongated third dorsal spine about equals the distance from the snout to the upper angle of preoperculum. The pectoral enters about $1\frac{2}{3}$ times in the head's length. The ventral little exceeds the head, and rarely extends to the vent.

The scales are small; there are 135 to 140 oblique rows extending from the scapular region to the end of the caudal peduncle; there are twelve rows between the origin of the first dorsal and the lateral line, and ten between its end and the line.

D. 10	54	A. 46.
9	57	A. 47.
10	58	A. 50.

The color is brownish, lighter and suffused with yellowish below the lateral line, and with the belly almost yellow. The fins are very dark. The interior of the mouth is simply sparingly punctulated with blackish.

The name of *Phycis tenuis* is connected with this species, as the latter agrees with its description in having "brown back and sides," the fins "dark brown, save the ventral," the rays approximately. "D. 11. 54. A. 44.." But it is necessary to recall that the *Gadus tenuis* is said to have the "throat internally streaked with red and purple. Vent nearer the head." The latter, however, as will be seen from other descriptions by Mitchill, has been used at random, and, with the not unusual vagueness of Dr. Mitchill, in an absolute and not relative sense; as to the other character, I have not noticed it in any specimen of *P. chuss*, and it is quite possible that the dark purple dots of the present species may assume a "streaked" arrangement on the reddish ground of the throat. The color and radial formula militate against the idea of its identity with the *Gadus longpipes* (= *Phycis chuss*), immediately afterwads described by Mitchill, and we may also take into consideration, but without assigning to it undue value, the improbability of the description under two names at the same time of so characteristic a species as the *P. chuss*. For the present, therefore, I venture to present the species in question under the name of Mitchill. It is true that the identification is not positive, but not less uncertainty would prevail in connection with the name of *P. Dekayi* hereafter noticed.

In the "Report on the Fishes of Massachusetts," Dr. Storer has given a description of the species under the name of *Phycis americanus;* in his Synopsis, a vague notice under the same name, nearly applicable to each, but with the synonymy of the true *P. americanus*; and, finally, in his "History of the Fishes of Massachusetts," he has again described and well figured the same species under the same name, giving a new one to the true *P. americanus* which had been then recently discovered on that coast.

In the "Archiv für Naturgeschichte" for 1858, Dr. Kaup has briefly noticed a species from North America, similar to the "*P. tinca*" (*P. chuss*), but with a longer snout, higher body, and considerably smaller scales, D. 10. 54. A. 47; this portion of the description, so far as it goes, is applicable to the present species, and was, doubtless, based on representatives of it. He places the species, however, in a section distinguished by having the ventral fins, nearly or quite twice as long as the head, and, if this statement is literally applied, Kaup's

species can scarcely be the same as the one in question, but it is probable that we should take his diagnosis with some latitude.

A reference to the species recently described by Dr. Günther from two specimens in the British Museum, under the name *Phycis rostratus*, may be here appropriate. The habitat of the species is unknown; it was suggested that the specimens ought, perhaps, to be referred to *P. americanus*, (= *P. chuss*), "but that species appears to have considerably longer ventral fins." "*P. Dekayi*, briefly noticed by Kaup, is stated to have the body more elevated than *P. americanus*; and the ventrals, nearly or quite twice as long as the head."* The lateral line of *P. rostratus*, has about 150 scales, and there are "ten series of scales between the anterior dorsal and the lateral line;" "the ventral extends the origin of the anal," but yet is "not much longer than the head." The specimens are eight inches long, or about the same size as those of *P. tenuis*, here described. From this notice, *P. rostratus* appears to differ from either of the two here enumerated. It remains, however, to ascertain whether it is an American fish, and then whether it is not Mitchill's *Gadus tenuis*.

Genus UROPHYCIS Gill.

Urophycis regius Gill.

Blennius ——— *Schœpf*, Ges. N. F., viii. pt. 2, p. 142.
Blennius regius *Walbaum*, Art., p. 186, 1792.
Enchelyopus regalis *Bl. Schn.*, p. 53, 1891.
Gadus blennoides *Mitch.*, Med. and P. Reg., iv. p. 1814.
Gadus punctatus *Mitch.*, op. cit., iv.
Phycis punctatus *Dekay*, N. Y. F., p. 292, pl. 46, f. 149, 1842.
Phycis regalis *Kaup*, Arch. f. Nat., 1858, i. p. 89.
Hab.—New York.

Subfamily *LOTINÆ* Gill.

Genus MOLVA (Flem.) Nilsson.

Molva vulgaris Fleming.

Gadus molva *Fabr.*, Faun. Groenl., p. 148.
Lota molva *Storer*, Syn.
Hab.—Greenland.

Greenland representatives of this genus have been identified by European naturalists with their *Molva vulgaris*. I am not acquainted with the American type, except through such sources.

Subfamily *CILLIATINÆ* Gill.

Genus ONOS Risso.

Les Mustèles *Cuv.*, R. A., 1817, ii. 215.
Onos *Risso*, Eur. Merid., iii. 214, 1827.
Mustela *Stark*, Ed. 1, p. 425, 1828.
Gadus *Fleming*.

Bonaparte quotes the *Gaidropsarus mustellaris*, of Rafinesque, among the Synonyms of his *Motella mediterranea*, which is the *M. tricirrata* of authors. Rafinesque gave the following diagnosis of the genus and species in the "Indice d Ittiologia Siciliana:"

"Genere *Gaidropsarus*. Piv di un raggio all' ale giugulari, due ale dorsali, la seconda delle quali è reuniata coll' ala caudale, e con l'anale "*Gaidropsarus mustellaris*. Quattro barbette, due alla mascella superiore, e due all' inferiore, ale giugulari con due raggi inuguali.—*Sinonimia*, *Mustella Rondelet*, *lib.* 9, *cap.* 16, fig."

* The statement of the length of the ventrals is in the diagnosis of a section (a) of the genus.

As the *Motella tricirrata* has five-rayed ventral fins, the second dorsal not united with the caudal and anal, and only one barbel to the lower jaw, and thus has only one character of least importance mentioned by Rafinesque, I am not prepared to accept his name for the genus, although he quotes the figure of Rondelet. The French name of Cuvier cannot be retained, and Risso's comes next in order.

Two species are found in North America which represent European ones, and are very closely related to their respective analogues.

ONOS REINHARDII Gill.

Motella mustela *Reinhardt*, Kong. Dansk. Vid. Selks. Nat. og Math., vol. vii. pp. 115, 128.
Motella Reinhardi *Kroyer*.
Hab.—Greenland.

Closely related to the *O. mustela* of Europe, and agreeing in having five barbels, one to each nostril and one at the chin.

ONOS ENSIS Gill.

Motella ensis *Reinh.*, op. cit., vol. vii. pp.115, 128.
Hab.—Greenland.

Very closely allied to the *M. tricirrata* Nils., and like it provided with three barbels, one at each anterior nostril and one at the chin.

Genus RHINONEMUS Gill.

RHINONEMUS CAUDACUTA Gill.

Motella caudacuta *Storer*, Proc. Boston, vol. 1848, p. 5 ; Mem. Am. Ac.
Motella cimbria ? *Bell*, Canadian Nat. and Geol., vol. iv. p. 209, 1859.
Hab.—Massachusetts to Gulf of St. Lawrence.

Very closely related to the *Motella cimbria* of Europe, but has "the posterior margin of the second dorsal and anal fins, as well as the edge of the caudal fin, of a dark slate color," and D. 53. A. 48.

Genus CILIATA Couch.

Couchia *Thompson*.

CILIATA ARGENTATA Gill.

Motella argentata *Reinhardt*.
Couchia argentata *Günther*, ii. 363.
Hab.—Greenland, (Reinhardt ;) and Nahant, Mass., (Dr. J. H. Slack.)

Subfamily *BROSMINÆ* Gill.

Genus BROSMIUS Cuv.

The American species of this genus are involved in some uncertainty. Although attributed to Greenland, it is at least nearly certain that the European *Brosmius brosme* is not found in our southern waters, but it is not, perhaps, quite clear what name the American analogue shall bear. Lesueur has described and figured a species from Marblehead, to which he gives, both in his description and figures, a protuberant lower jaw and a double barbel; it has been named *Brosmius flavesny*, and is stated to be salted like the common cod, much esteemed as food, and to be rare on the banks of Newfoundland. No specimens with the characters noticed have since been obtained, and, if only the double barbel had existed, it might not have been impossible that Lesueur had obtained a single specimen of the common cusk, which exhibited such abnormal characters, the duplication of the barbel having been noticed in a specimen of the *Gadus arenosus* already referred to. Such, however, appears to be highly improbable, for it is not simply a double barbel which characterizes it, but at least, in addition thereto, a longer lower jaw

and a more advanced dorsal fin. These will all have to be reconciled or explained away, before Lesueur's name can be adopted for the common cusk.

By Dr. Storer, the Lesueurian name was first unequivocally appropriated for the common *Brosmius*, and this was done without any notice of the discrepancies between the characters mentioned by Lesueur and those exhibited by his specimens. Yet the latter were described, and one figured by Storer, with "a single barbel," "the upper jaw slightly longer than the lower," and the dorsal commencing "on a line above the anterior half of the poctorals." Until it is demonstrated, or rendered nearly certain, that no species exhibiting the characters in a normal condition mentioned by Lesueur exists on our coast, it is not allowable to so apply his name, and, consequently, a new one is required for the *Brosmius flavescens* of Storer.

BROSMIUS BROSME White.

Gadus brosme *Fab.*, quasi *Müll.*
Brosmius vulgaris *Reinh.*, quasi *Cuv.*
Brosmius brosme pt. *Gill*, Cat.
Hab.—Greenland.

I only know this species as a Greenland fish through the works of Fabricius and Reinhardt.

BROSMIUS AMERICANUS Gill.

Brosmius vulgaris *Storer*, Rep., 136.
Brosmius vulgaris ? *Dekay*, p. 289, (not fig.)
Brosmius flavescens. *Storer*, Syn., 221.
Brosmius brosme pt. *Gill*, Cat., 49.
Hab.—New England coast northwards to Newfoundland.

BROSMIUS FLAVESCENS Les.

Le Brosme jaune *Les.*, Mem. Mus., v. p. 158, pl. 16, (mid. fig.) 1819.
Brosmius flavesny " " " " " "
Brosmius flavescens *Günther*, iv. 369.
Hab.—Massachusetts and banks of Newfoundland.

Deecriptions of the Genera of GADOID and BROTULOID FISHES of Western North America.

BY THEODORE GILL.

The object of the present article is more especially to give the characters of the genus *Gadus* as recently restricted, to develope the characteristics and unravel the synonymy of the genus *Merlucius*, concerning which, and particularly the Californian representatives, considerable confusion exists, and to elucidate the genus *Brosmophycis*.

I am disposed to believe that Günther is correct in separating from the family of Gadoids the group of genera which he has called *Brotulina*, but it is more than questionable whether he is right in referring to, and combining in, the same family his groups *Ophiidina*, *Fierasferina*, *Ammodytina* and *Congrogadina*. It is quite true that Dr. Günther has been unable to find any one character to separate his families Gadidæ and Ophidiidæ, and that he has entirely based them on the different combinations of characters, but it is at the same time probable that they will be eventually found to be distinguishable by true family characters, based on anatomical differences, such as the form of the cranium, maxillary bones, intestinal canal, &c. The distinctive characters which Günther has employed for his families are the following:

GADIDÆ with "ventral fins composed of several rays, or, if they are reduced to a filament, the dorsal is divided into two. Either the caudal free

from the dorsal and anal, or, if the vertical fins are united with the dorsal, with a separate anterior portion. Rays of the second dorsal well developed."

Ophidiidæ with "ventral fins rudimentary (reduced to a filament), or absent, jugular.* No separate anterior dorsal. Caudal generally united with dorsal and anal."

From the Gadoids I am disposed to separate the genera *Raniceps* of Cuvier and *Bregmaceros* of Thompson, the former of which has been already considered by Dr. Parnell† as the type of an independent family,—and to similar rank, the latter is probably likewise entitled.

The only diagnosis, then, which I am at present prepared to give, is the following. I trust soon to be able to examine the skeletons of most of the types, when more definite characters can doubtless be given. Only part of the synonymy of the family is given.

Family *GADOIDÆ* (Cuv.)

Synonymy.

Gadini *Rafinesque*, Indice d'Ittiologia Siciliana, 1810.
Gadinia *Rafinesque*, Analyse de la Nature, 1815.
Metrosomes *Blainville*, Journal de Physique, t. 83, p. 255, 1816.
Gadoides *Cuvier*, Régne Animal, ed. 2, tome 2, p. 330, 1829.
Gadites *McMurtrie*, Animal Kingdom Transl., vol. ii. p. 243, 1831.
Gadoideæ *Richardson*, Fauna Boreali-Americana, vol. iii. p. 241, 1836.
Gadidæ *Bonaparte*, Systema Vertebratorum, p. 52, 1840.
Gadidæ *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 326, 1862.
Blennidia and Gadinia pt. *Raf.*

Elongated fishes behind more or less compressed and conoidal, tapering into the caudal fin, the peduncle convex at its end; anus in advance of the middle of the body; the scales cycloid, smooth and small; very wide branchial apertures, extending far forwards; rays of all the fins articulated or branched, extending along most of the back and forming one, two, or three fins; anal single or double, vertical fins rarely united, and the ventral fins more or less in advance of the pectoral, normally attached to the pubic bones, narrow, and with three to seven branched rays; rarely represented by articulated bifid filaments. Pyloric cæca generally numerous.

The Californian representatives of the family belong to two distinct subfamilies and genera, which may be distinguished as follows:

I. Ventral fins well developed, with five to seven rays. Pyloric cæca numerous.
  α. Dorsal fins two; the posterior sinuated, or emarginated behind the middle; anal similar to the second dorsal. Skull with the great frontal bone double, concave towards the middle and between the ridges on each bone diverging from the corresponding branches of the fork of the occipital crest..... ..... Merluchinæ.
  Merlucius.
  β. Dorsal fins three; anal two. Skull with the great frontal bone single, and with the occipital crest more or less continued forwards, and single or entire..... Gadinæ.
  Gadus.

* "Except in *Brotulophis*."—Günther.
† Magazine of Zoology and Botany, vol. i. 1837.

Subfamily MERLUCIINÆ (Sw.) Gill.

Synonymy.

Merluccia *Rafinesque*, Analyse de la Nature, 1815.
Merluccinæ *Swainson*, Natural History of Fishes, Amphibians and Reptiles, vol. ii. p. 300, 1839.
Gadini pt. *Bon.*
Gadinæ pt.

The present subfamily has only its type in common with those of Rafinesque and Swainson,—the former having included in his Merluccia the genera *Gadus*, *Merluccius*, *Trisopterus*, R., *Strinsia*, R. and *Brosme*, while Swainson referred to his Merluccinæ the genera *Merluccius*, *Lota* and *Motella*.

Only one genus is yet positively known. *Uraleptus* and *Physiculus* appear, however, to be nearly related.

MERLUCIUS Raf.

Synonymy.

Meluccius *Rafinesque*, Caratteri di Alcuni nuovi generi e nuovi specie di Animali e Pianti della Sicilia, 1810.
Onus *Rafinesque*, Indice d'Ittiologia Siciliana, p. 12, 1810.
Merlangus *Rafinesque*, op. cit., p. 67, 1810.
Stomodon *Mitchill*, Report in part on the Fishes of New York, p. 7, 1814.
Hydronus *Mindling*, Lehrbuch der Naturgeschichte der Fische, p. 83, 1832.
Homalopomus *Girard*, Proc. Academy of Natural Sciences of Phila., vol. viii. p. 132.
Homalopomus *Girard*, Explorations and Surveys for a Railroad Route, &c, vol. x. p. 144, *Fishes*.
Merlus *Guichenot*, Historia Fisica y Politica de Chile, *Zoologia*, t. ii. p. 328, 1848.
Epicopus *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. ii. p. 248, 1860.
Gadus sp. *Linn.*, &c.
Merlangus sp. *Ayres*.
Gadus (Boreogadus) sp. *Günther*.

Body elongated and slender, fusiform, highest under the first dorsal fin, tapering into the caudal peduncle, which is slender and compressed; back transversely arched; abdomen not tumid.

Scales small, perlaceous, regularly imbricated.

Lateral line slightly declining from the scapular region, and thence rectilinear, in a groove covered by a membranous linear band.

Head oblong conical in profile, above very gradually narrowed towards the front, rectilinear, flattened at the nape, with a well-defined, oblong triangular excavation at the forehead, bounded by the ridges on the separated frontal bones, which converge backwards into the low occipital crest; snout not extending as far forwards as the maxillars. Eyes rather large, chiefly in the anterior half of the head. Opercula distinct; preoperculum with a channel behind its crest or inner margin, and with short, radiating bars crossing it.

Mouth with its cleft moderately oblique and deep, the supramaxillars extending entirely or under the greater portion of the eyes; their ends are obliquely extended backwards and downwards in a curve from the lower angles; intermaxillars elongated and extending nearly as far back as the supramaxillars.

Lower jaw with no barbel, rounded in front, more or less projecting beyond the upper.

Teeth nearly biserial in the upper as well as lower jaw; the teeth of the inner row moveable, longest, slender, bent or curved inwards, crystalline

and rather abruptly pointed at the tips. Vomer with teeth like those of the jaws.

Branchiostegal rays seven.

Dorsal fins two, separated by a decided interval; the first behind the vertical of the pectoral fins, pointed in front, triangular, and with nine to fifteen rays; second divided into two portions by a deep sinus behind its middle, and with its posterior part highest.

Anal opposite and similar to the second dorsal.

Caudal fin emarginated, with numerous supplementary rays above and below the peduncle.

Pectoral fins slender, rather long and obliquely rounded behind.

Ventral fins inferior, little distant (about the width of their bases) and moderately in advance of the pectorals, rather long, and with seven rays, of which the fourth to sixth are longest.

D. (9) 10—15 | 36—45. A. 35—51. P. 14. V. 7.

The skull greatly differs from that of *Gadus*, as is indicated by the frontal depression seen through the skin. The great single frontal bone of the cods is in the *Merlucius* represented by two; each is traversed by a crest, which extends towards the front of the orbit, and which is continued from the corresponding branch of the fork of the supraoccipital crest; between the frontal crests thus placed, there exists a great depression of a triangular form, whose length is nearly twice as great as its anterior width; the sides of this depression are steep and even scooped out.

This genus is one of the most trenchant and strongly-marked among fishes, and contains among its representatives some of the most common and widely-distributed species,—all the seas of the Northern hemisphere being provided with them. Those species at the same time are themselves objects of considerable economical importance, and are also famed for the ravages which they commit on the other inhabitants of the sea. Yet this genus, so characteristic and so peculiar, and concerning which less confusion might be supposed to exist than almost any other, has been singularly misunderstood and received, through the misapprehensions of authors, a number of names which require to be ranked among its synonyms.

Rafinesque first proposed to take the Linnæan specific name of its type as the generic designation, but soon afterwards, with accustomed fickleness, substituted the name of *Onus*, and, finally, discovering that such after all was not the true name, corrected it to *Merlangus*;* all this was the fruit of the year 1810!

In the "Report, in part, on the Fishes of New York," Dr. Mitchill gave a description of a "hard-featured fish bought in the New York market, November 4, 1813," conferring on it the new generic as well as specific name of *Stomodon bilinearis*. This is quite a recognizable notice of the common hake of New York and the Eastern coast of the United States; Mitchill has, however, erroneously assigned only four ventral rays; he has hazarded no conjectures as to its affinities. In his subsequent memoirs no allusion is made to this name, but the species reappears in the "Memoir on the Fishes of New York," under the name of *Gadus merluccius*, and again in the "Journal of the Academy of Natural Sciences" as the new species *Gadus albidus*.

For some time after, the genus remained in this condition, no one having erred very widely concerning its affinities, and only one author having referred to a new species. But in 1855, Dr. Ayres, in California, described a species of that coast as a *Merlangus*, and Dr. Girard in the East as a supposed new generic type of *Trachinoids* from the same waters, under the name of *Homalopomus Trowbridgii*; the latter gentleman afterwards discovered that

* "In vece di Onus, sp. 30 [*Onus riali* = *Gadus merluccius*, L.] leggete *Merlangus*."

the species of Ayres and his own were at least "very closely allied," and evidently belonged "to the same genus, whether *Merlangus*, *Merlucius*, or *Homalopomus*:" he stated that "the natural affinities of the genus *Homalopomus* are intermediate between *Merlangus* and *Merlucius*, the dorsal and anal fins being constructed upon the pattern observed in *Merlangus*, whilst the ventral fins are identical in structure with those of *Merlucius*." Had he "not framed the genus under misapprehended affinities" he "would have placed the species in the genus *Merlangus* or *Merlucius*, it was immaterial where, and await further examination upon the Fishes of the North Pacific Ocean."

The reviewer* has referred the type of Girard positively to the genus *Merlucius*, believing that it was not "immaterial" in what one it should be placed, and, after the requisite comparisons, thinking that a great difference existed in the "pattern of the dorsal and anal fins" between the *Homalopomus* and *Merlangus*, while there was none between the former and *Merlucius*.

In the second volume of the "Catalogue of the Acanthopterygian Fishes in the Collection of the British Museum," Dr. Günther has proposed a genus of the group Trachinina of the family Trachinidæ, for a fish in "bad state," identified by him with the *Merlus Gayi* of Guichenot. The new genus was designated *Epicopus*, and to it were attributed "two dorsals, the first with nine or eleven feeble spines; ventrals jugular, with one spine and six soft rays;" "jaws, vomer and palatine bones with strong cardiform teeth;" "branchiostegal rays six." Dr. Günther does not at all object to the figure of "*Merlus Gayi*," as he generally does, in referring to a poor figure; and, as that figure represents a fish with an undivided second dorsal and anal fins scarcely decreasing backwards, almost produced behind, with well-branched rays, three slender anal spines, and the caudal peduncle little produced into the fin, it would have been naturally supposed that those characters existed in the specimen examined by Günther; that gentleman does not allude to any peculiarity of the upper surface of the head. He, finally, referring to Guichenot's reference of this species to *Merlucius*, remarked that he had, "however, convinced (himself) that the first dorsal is composed of rays which are neither articulated nor branched." At the same time, Günther, in a note to the Trachinina, indicated his belief in the pertinence of *Homalopomus* to the Trachinina. Influenced by the positive statements of Günther, the reviewer, in a "Synopsis of the Notothenioids," and an analysis of Günther's family of Trachinidæ, referred *Epicopus* to the family of Latiloidæ, a detachment from the Trachinidæ.†

But, in the fourth volume of the Catalogue of the Fishes in the British Museum, Dr. Günther announced that his *Epicopus Gayi* proved to be the "young" of *Merluccius vulgaris* in "a very bad state of preservation, and without any indication of the locality in which it has been procured. The simple structure of the rays of the first dorsal appears to be peculiar to the young state.‡ The roughness on the palatine bones were caused by calcareous deposits (the specimen was preserved in chloride of zinc), but there are no true teeth."§ The *Merlus Gayi* is then admitted as a species of *Merluccius*. To the same genus is also referred in a foot-note, as a doubtful species, *Gadus fimbria* of

* Gill, in "American Journal of Science and Arts," ser. 2, vol. xxx. p. 279, 1860; and in "Proc. Academy of Natural Sciences of Phila., 1861, p. 514.

† In the paper cited, there is the reference (*) to a foot-note after Latiloidæ, but the note itself was accidentally omitted. In this note, it was remarked that there were provisionally referred to the Latiloidæ the genera *Latilus*, *Pinguipes*, (Latilinæ,) *Malacanthus*, (Malacanthini,) *Percophis*, *Aphritis*, (Aphritinæ,) and *Epicopus*, but that each group probably represented a distinct family; and reference was made to the equivocal character of the ventral fins of *Epicopus*, and the very doubtful relations of the genus.

‡ In the smallest specimen of *Merlucius bilinearis* examined, (about six inches long,) the rays of the first dorsal and the first ventral ray were found to be at least as much bifurcated and as decidedly articulated as in the adult.

§ Günther, op. cit., iv. p. 346.

Pallas, a fish of the Northwestern coast of America. This species, however, as is at once evident from the description, has no relation with *Merluccius* more than a large proportion of other fishes, and evidently belongs to the genus *Anoplopoma* of Ayres ; it is a true Acanthopterygian, apparently the type of a peculiar family allied to the Chiroids. In this reference, Günther has committed the same error as Girard. On the other hand, Günther has referred to the genus *Gadus* and his subgenus *Boreogadus*, the *Merlangus productus* of Ayres or *Homalopomus Trowbridgii* of Girard, which is without the slightest doubt a genuine *Merluccius*, very closely allied to the Eastern species, as the figure of Girard and the reference to its true genus by the reviewer might have satisfied him.*

The genus *Merlucius* contains at least five species if the *Merlus Gayi* truly belongs to it. These species are distributed in the following manner :

MERLUCIUS VULGARIS Fleming.

Coasts of Europe and the Polar Seas.

MERLUCIUS BILINEARIS Gill ex Mit.

Coasts of Eastern North America from Virginia northwards.

MERLUCIUS PRODUCTUS Gill ex Ayres.

California.

MERLUCIUS ARGENTATUS (Faber) Gthr.

Iceland.

MERLUCIUS GAYI Gthr. ex Gay.

Chili.

If the execrable figure given in Gay's great work on Chili were at all reliable, it would indicate that the *Merlus Gayi* could scarcely be a true *Merlucius*, but since Guichenot says that that species resembles the European type as to the prolonged, little-compressed body, scales, opercula, *form of the fins* and other characters, it must be at least provisionally retained here. No one would suppose from the figure alone that a *Merlucius* was intended, as the likeness is only a strong analogical one, such as may exist between members of entirely distinct groups.

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MERLUCIUS PRODUCTUS Gill.

Synonymy.

Merlangus productus *Ayres*, Proc. California Academy of Natural Sciences, vol. i. p. 64, 1855.

Homalopomus Trowbridgii *Girard*, Proceed. Academy of Natural Sciences of Phila., vol. viii. p. 132, 1856.

Homalopomus Trowbridgii *Girard*, Explorations and Surveys for a Railroad Route, &c., vol vi. Abbot's Report, *Zoology*, p. 23.

Homalopomus Trowbridgii *Girard*, op. cit., vol. x. *Fishes*, p. 144, pl. xl*a*, figs. 1—4.

Merlucius sp. *Gill*, American Journal of Science and Arts, ser. 2, vol. xxx. p. 279 ; Proc. Academy of Nat. Sci. of Phila., 1861, p. 514.

Gadus productus *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 338, 1862.

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* Guenther has also retained, in a foot-note, as a doubtful species of *Merluccius*, the *M. ambiguus* of Lowe, (Proc. Zool. Soc., 1840, p. 37),—a most ambiguous species, certainly, as to its systematic position. The only knowledge of the fish is confined to the facts of the "production into a filament of the second ray of the ventral fins and grooved nape," wherefore supposed to resemble *Motella*, but wanting "the beards and having no trace of any fin within the nuchal groove." "The upper jaw closes over the under." This notice enables us to decide that it decidedly does not apply to a *Merlucius*, but does not distinguish it from the *Uraleptus maraldi*.

Subfamily *GADINÆ* (Bon.) Gill.

Synonymy.

Gadini *Bonaparte*, Saggio di una Distrubuzione Metodico degli Animali Vertebrati, 1831.
Gadinæ *Swainson*, Natural History of Fishes, Amphibians and Reptiles, vol. ii. pp. 188, 299, 1839.
Gadini *Bonaparte*, Systema Vertebratorum, p. 52, 1840.
Gadinæ *Kaup*, Archiv für Naturgeschichte, 1858 b. i. p. 86.
Gadiformes *Bleeker*, Enumerato specierum Piscium hucusque in Archipelago Indico Observatorum, p. 26, 1859.
Gadinæ *Gill*, Catalogue of the Fishes of the Eastern Coast, &c., 1860.

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I. Vomerine teeth obsolete.
  1. Barbel none ..... Gadiculus.
  2. Barbel present (*Gadus blennoides* Pallas)..... Leptogadus.
II. Vomerine teeth developed.
  A. Lower jaw longest and projecting beyond the upper.
    α. Vent nearly below the interspace between the first and second dorsals.
      1. Teeth of the upper jaw not or scarcely enlarged in the outer row ..... Pollachius.
      2. Teeth of the upper jaw enlarged in the external row..... Boreogadus.
    β. Vent situated at or before the vertical of the origin of the first dorsal; first anal fin very long; second dorsal small ..... Micromesistius.
  B. Lower jaw shorter than, and generally received within, the upper.
    α. Barbel of chin obsolete..... Merlangus.
    β. Barbel more or less developed and pendant from chin.
      * Mouth enlarged, the supramaxillars extending more or less under the eyes.
        † Snout longer than the eye.
          1. Teeth of the outer row of upper jaw and inner of lower scarcely enlarged. Vomer with no elongated teeth..... Gadus.
          2. Teeth of the outer row of upper jaw and inner of lower on sides elongated and slender, the first of the upper largest. Vomer with its posterior teeth considerably elongated..... Odontogadus.*
        †† Snout shorter than eye. Abdomen abbreviated..... Brachygadus.
      ** Mouth rather small, the supramaxillars not extending as far as the eyes..... Melanogrammus.

Genus GADUS Artedi.

Synonymy.

Gadus *Artedi*, Genera Piscium, p. 18, 1738.

* Odontogadus *Gill*,—a genus established on the *Gadus euxinus* of Nordmann. The teeth of the lower jaw are nearly biserial. The skull is much like that of *Gadus*, but the great frontal is wider in front, and the base of the cranium more flattened and bulging outwards, &c. Five specimens of this rare species, obtained by the Hon. Geo. P. Marsh at Constantinople, are in the Smithsonian Institution. They evidently belong to the species named *Gadus euxinus* by Günther, on whose identification with Nordmann's species I rely, being unacquainted with the memoir of the latter author. The species, although covered by the technical character of *Morrhua* of Cuvier, is apparently at least as nearly allied to *Merlangus* (*vulgaris*).

Callarias *Klein*, Historiæ Piscium Naturalis promovendæ Missus quintus et ultimus, p. 5, 1749.
Morrhua *Cuvier*, Regne Animal.
Gadus *Nilsson*, Prodromus Ichthyologiæ Scandinavicæ, pp. 39, 41, 1832. Adopt Bon.
Gadus, Cephus, Tilesia } *Swainson*, Natural History of Fishes, Amphibians and Reptiles, vol. ii. pp. 188, 299, 300, 1839.
Gadus *Gill*, Proc. Academy of Natural Sciences of Phila., 1862.
Gadus *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. pp. 326, 327, 1862.
Morrhua *Putnam*, Bulletin of the Museum of Comparative Zoology of Cambridge, 1863.

Body elongated, subfusiform in profile, but highest under the first dorsal fin, tapering into the moderately slender caudal peduncle, which is compressed; back compressed and oblique, and abdomen prominent and rather tumid beneath the first dorsal.

Scales minute and regularly imbricated.

Lateral line slightly convex from the scapular region to the middle of the body, and thence rectilinear, in a groove covered by a membranous linear band.

Head scaly, oblong conical in profile, above gradually narrowed towards the front, transversely arched at the nape, nearly flat at the forehead, and with the snout protuberant and longer than the eye. Eyes moderate, mostly or entirely in the anterior half of the head. Opercula almost concealed by the skin; operculum acute at the angle. Nostrils in front of eye; the anterior with a posterior flap; the posterior patulous or subtubular.

Mouth with the cleft moderately oblique and rather deep; the supramaxillars extending at least under the anterior half of the eyes, their ends produced downwards and truncated behind; intermaxillars ceasing far in front of the ends of the supramaxillars. Lower jaw received within the upper, broadly rounded in front.

Lower jaw with a moderate barbel persistent on the bone.

Teeth pauciserial in each jaw; those of the outer row in the upper, and of the inner in the lower, enlarged.

Branchiostegal rays seven.

Dorsal fins three, separated by decided interspaces, invested in a naked skin; the first shortest, more or less behind the vertical of the pectoral fins, rounded or angular in front, and rapidly declining in a more or less convex line decurved backwards; second oblong and longest.

Anal fins two, opposed to the second and third dorsals and nearly equal in size and form.

Caudal fin moderate, subtruncated, concave or convex, with numerous supplementary rays above and below.

Pectoral fins moderate, obliquely rounded behind.

Ventral fins inferior, moderately approximated, inserted moderately in advance of the pectorals, narrow and provided with seven rays, the second of which is more or less prolonged.

D. 12—14 | 16—21 | 17—22. A. 18—26 | 17—24.

Artedi, in his "Genera Piscium," establishing this genus in the manner of the moderns, gave the following diagnosis:

"*Membrana branchiostega* utrinque septem ossicula subteretia continet.
"*Dorsum* jam tripterygium, jam dipterygium.
"*Caput* plerumque cathetoplateum, interdum plagioplateum."

To the genus were referred the following species:

1. Merlangus vulgaris *Flem.*

2. Pollachius carbonarius *Bon.*
3. " typus *Bon.*
4. Gadus morrhua *L.*
5. Melanogrammus æglifinus *Gill.*
6. Brachygadus luscus *Gill.*
7. " minutus *Gill.*
8. Merlucius vulgaris *Flem.*
9. Molva vulgaris *Flem.*
10. Lota vulgaris *Cuv.*
11. Onos mustela *Gill.*

Klein, in his fifth and last "Missus," (1749,) substituted the name *Callarias*, and restricted the genus to species with three dorsal fins, the head trochiform, the tail coniform and girdled by the caudal.

The species were distributed among two sections.

CALLARIAS, barbatus, cirro unico, pendulo e mento.

1. Gadus morrhua *L.*
2. Melanogrammus æglifinus *Gill.*
3. Brachygadus luscus *Gill.*
4.*Gadus morrhua *L.*
5.* " "
6.* " "
7.* " "
8. " " ?
9. " " ?
10. Brachygadus minutus *Gill.*

CALLARIAS, imberbis.

1. Pollachius typus *Bon.*
2. " carbonarius *Bon.*
3.*Merlangus vulgaris *Cuv.*
4. Trachurops macarellus *Gill* ex *C. et V.?*

This genus is surprisingly natural and well defined, compared with most of Klein's genera, and is co-equal with Günther's *Gadus* or Cuvier's *Morrhua* and *Merlangus* combined. The name cannot, however, be retained, as it is a synonym of *Gadus*.

Cuvier accepted the name *Gadus* in nearly its Artedian sense, distributed the species among smaller groups, called by him subgenera, and did not apply the name itself to one of them, but conferring an independent one on each—called one of his subgenera *Morrhua*, characterizing it by the three dorsals, two anals and a barbel at the chin. To it were referred the species of *Gadus*, *Brachygadus* and *Melanogrammus*.

Nilsson, in his "Prodromus Ichthyologiæ Scandinavicæ," (1832,) modified the subgenus *Morrhua*, including under it only *Gadus* and *Brachygadus*, while *Melanogrammus* formed part of his *Merlangus*. He gave the following diagnosis:

"Corpus forma elegantiore; pinnis dorsi tribus; ani duabus & cirro mentali; rostro extra maxillas procedente; corpore maculis variegato; cauda subæquali."

Bonaparte has adopted Nilsson's arrangement.

Swainson, in 1839, proposed for the Cuvieran Morrhuæ three genera,—*Gadus*, really equivalent to *Morrhua; Cephus* for the *Gadus macrocephalus* of Tilesius and *Tilesia* for the *Gadus gracilis* of the same author. These genera are due to mistaken ideas, and the distinctions signalized do not exist.

The reviewer has lately limited the genus as here adopted.

Finally, Mr. Putnam, some time afterwards, being apparently unacquainted with the different applications of the name by Nilsson, Bonaparte and the

reviewer, restricted the name *Gadus* to the genus named *Melanogrammus* and retained Cuvier's *Morrhua* for the present genus.

The genus *Gadus* as here defined does not embrace a number of species referred to it by previous authors, for from it, by the terms of the description, are excluded the *Gadus æglifinus* of Linnæus, or the common haddock, which now is the type of the genus *Melanogrammus;* the *Gadus minutus* and *G. luscus* of Linnæus belonging to *Brachygadus*.

The species, or at least the nominal species, of authors which appear to be really congeneric and members of the same genus—*Gadus*—are the following. Those whose claims to specific rank are most doubtful and require to be confirmed, are indicated by an asterisk placed after their respective names.

§ I.

Anus under the anterior portion of the second dorsal fin.

GADUS MORRHUA Linn.

Northern European and Polar Seas.

GADUS ARENOSUS Mitchill.*

Coast of Middle and Eastern United States northwards to Hudson's Bay.

GADUS OJAC Richardson.*

Greenland.

GADUS NAVAGA Kœlreuter.

Coasts of Northern Russia.

GADUS GRACILIS Tilesius.(*)

Kamtschatka.

GADUS MACROCEPHALUS Tilesius.

Kamtschatka.

§ II.

Anus under the hinder portion of first dorsal.

GADUS TOMCODUS Walbaum.

Middle and Eastern States northwards to Newfoundland.

GADUS PROXIMUS Girard.

California and Oregon.

It is very doubtful, from the slight description, whether the *Gadus pygmæus* of Pallas belongs to this genus: it is said to have five (?) branchiostegal rays, the lateral line obsolescent behind, and the following number of fin rays: D. 16 | 16 | 19. A. 18 | 15. C. 28, very much crowded. P. 17. V. 6. The specimen described, about seven inches long, was obtained by Dr. Merk at Cape Elias in Russian America. It is asked by Pallas whether it may not be the *Gadus minutus* of Linnæus? Such cannot be the case.

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GADUS GRACILIS Tilesius.

Synonymy.

Gadus wachna *Pallas*, Zoographia Rosso-Asiatica, vol. iii. p. 182, 1831.
Gadus gracilis *Tilesius*, in Zoographia Rosso-Asiatica, vol. iii. p. 182, 1831.
" " " Mémoires de l'Academie Impériale des Sciences de St. Petersbourg, tome ii. p. 354, tab. 18. (1808) 1810.
Tilesia gracilis *Swainson*, Natural History of Fishes, Amphibians and Reptiles, vol. ii. p. 300, 1839.

Hab.—Kamtschatka and Kurile Islands (and Oregon?)

(*) The position of the anus in this species is doubtful, but it probably belongs to this section.

GADUS PROXIMUS Girard.

Synonymy.

Gadus proximus *Girard*, Proc. Academy of Natural Sciences of Phila., vol. vii. p. 141, 1854.
Gadus proximus *Girard*, op. cit., vol. vii. p. 151.
Morrhua californica *Ayres*, Proc. California Academy of Natural Sciences, vol. i. p. 9, 1854.
Morrhua proxima *Girard*, Explorations and Surveys for a Railroad Route, &c., vol. vi. Abbot's Report, *Zoology*, p. 22.
Moarhua proxima *Girard*, op. cit., vol. x. *Fishes*, p. 142, pl. xl.*a*, figs. 5—8.
Morrhua proxima *Girard*, op. cit., vol. x. Whipple's Report, *Zoology*, p. 50.
" " " op. cit., vol. x. Williamson's Report, *Zoology*, p. 86.
Gadus proximus *Gill*, Proc. Academy of Natural Sciences of Phila., 1862.
" californicus *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 332.

Hab.—California and Oregon.

Family *BROTULOIDÆ* Blkr.

Synonymy.

Brotuloidei *Bleeker*, Enumeratio specierum Piscium hucusque in Archipelago Indico Observatorum, &c., p. xxv. 1859.
Ophidiidæ (Brotulina) *Günther*, Catalogue of the Fishes in the British Museum, vol. v. pp. 370, 371, 1862.
Gadidæ pt. auct.

Elongated fishes, compressed and regularly tapering behind, with tail generally more or less subtruncated, with the anus submedian; scales either absent or cycloid and minute, imbedded in a lax skin, which more or less envelopes the fins; very large branchial apertures; vertical fins united, or contiguous, the dorsal commencing not far from the nape, the caudal narrow or pointed, the ventral fins replaced by simple or bifid filaments attached to the humeral arch and more or less in advance of the pectoral. Pyloric cæca few (1 or 2), rarely obsolete or in increased number (12).

The supramaxillars are generally enlarged behind and produced towards their upper angle.

The genera referred to the group *Brotulina* by Günther may be provisionally retained in this family and distributed in the following manner. The subfamilies, perhaps, do not follow in natural order.

I. Ventral fins inserted considerably in advance of the pectoral fins.
  I*a*. Body scaly, moderately long.
    A. Pyloric cæca none, one or two.
      α. Lateral line continuous.
        1. Snout and lower jaw with barbels. Cæca 1 or 2. BROTULINÆ.
          * Ventral filaments bifid..... Brotula.
          ** Ventral filaments entire..... Nematobrotula.*
        2. Head without barbels. Cæca 2..... BROSMOPHYCINÆ.
          * Head naked..... Brosmophycis.
          ** Head scaly..... Dinematichthys.
        3. Head without barbels. Cæca none..... LUCIFUGÆ.
          * Palatine bones without teeth..... Lucifuga.
          ** Palatine bones with teeth..... Stygicola.†
      β. Lateral line interrupted or double..... BYTHITINÆ.

* Type. *Brotula ensiformis* Gunther.
† *Lucifuga dentatus* Poey.

* Lateral line interrupted. Vomerine and palatine teeth	Bythites.
** Lateral line double behind. Vomerine teeth	Pteridium.
AA. Pyloric cæca in moderate number (about 12). Ventral fins inserted under or nearly under eyes	Sirembinæ.
* Preoperculum unarmed	Sirembo.
** Preoperculum with three spines	Hoplobrotula.*
?I*b*. Body naked, very long and compressed. Vertical fins confluent	Xiphasiinæ. Xiphasia.
?II. Ventral fins under the pectoral. Vertical fins confluent, (Kaup)	Brotulophinæ. Brotulophis.

BROSMOPHYCINÆ Gill.

Synonymy.

Brosmophycinæ *Gill*, Proc. Academy of Natural Sciences of Phila., 1862.

Brotuloids with a moderately elongated, scaly body, a more or less distinct caudal fin, two closely-approximated ventral filaments, a continuous lateral line, no barbels and (typically) two pyloric cæca.

The typical genera are *Brosmophycis*, represented in the Californian waters, and *Dinematichthys* of Bleeker, whose single species is found in the seas of the East Indian Archipelago. The Lucifugæ are, however, very closely related to those genera, and the difference in the posterior parts is rather one of degree than kind: they perhaps form a group of the subfamily.

Genus BROSMOPHYCIS Gill.†

Synonymy.

Brosmophycis *Gill*, Proc. Academy of Natural Sciences of Phil., 1861, p. 168.
Halias *Ayres*, Proc. Californian Academy of Natural Sciences, vol. ii. p. 52, 1861.
Brosmius sp. *Ayres*, 1854.
Dinematichthys sp. *Günther*, 1862.

Body moderately elongated, thick and with the abdomen more or less dilated, in front of the anus and behind compressed, and uniformly tapering to its truncated end. Anus rather behind the middle, with a scarcely raised margin and unarmed; second aperture behind and also little raised.

Scales minute, scarcely imbricated and imbedded in the skin, which is lax, and invests the dorsal and anal fins.

Lateral line inconspicuous, slightly convex above the abdomen and rectilinear behind.

Head naked, moderate, oblong conical in profile, moderately compressed and above nearly uniformly wide, with the snout longer than the eye, blunt and subtruncated, with deep pits in and near the margin of the skin above the maxillars. Eyes moderate, covered by the skin, situated nearly in the middle of the anterior half of the head. Nostrils nearly equidistant from the snout and eyes. Opercula covered by the skin; the operculum with a spine at its angle, terminating a bar on its inner surface, near the upper margin. Chin with two deep pits, one on each side.

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* Type. *Brotula armata* T. Schlegel.

† A second species of this genus was discovered at Cape St. Lucas by Mr. Xantus. Its height is scarcely less than a sixth of the length. The head enters $4\frac{2}{3}$ times in the total; the jaw equals half of the head's length; the snout equals nearly a fifth of the same. The dorsal fin commences with the second fourth of the length; the anal commences a third nearer the snout than the opposite end; the pectoral equals about half the length of the head; and the ventral filament is only about a fifth shorter than the head. The color is reddish-brown. The species may be named *B. ventralis.*

Branchiostegal rays six.

Mouth with its cleft scarcely oblique, quite deep, the supramaxillars extending behind the eyes, expanded towards their ends, especially at the upper angle. Teeth small, stout and rather blunt, in a band on each jaw, interrupted at the symphysis and narrowed on the sides behind. Vomer and front of palatines with similar teeth.

Dorsal fin rather low, and nearly even, with its origin behind the vertical of the pectorals, and almost connected to the base of the caudal behind.

Anal fin much shorter, but similar in form to the dorsal, and partly connected behind to the caudal.

Pectoral fins moderate, obliquely and convex nearer the lower rays, in an adipose skin.

Ventral filaments inserted under the preoperculum, compressed, closely annular, but not articulated like the rays of Phycis, &c.

The branchial arches have transverse scabrous ridges on each side of their concave surfaces, except the middle portion of the first below the bend, where the ridges of the outer side are replaced on the margin by about three produced, scabrous, subcylindrical processes. The cleft behind the fourth arch is moderate. There are no pseudo-branchiæ.

The stomach is large and sacciform, and, at the pyloric extremity, there are two short cæca, one on each side.

This genus is most nearly allied to *Dinematichthys* of Bleeker, but distinguished by the scaleless head, dentition and the absence of claspers to the anal papilla, &c.

BROSMOPHYCIS MARGINATUS Gill.

Synonymy.

Brosmius marginatus *Ayres*, Proc. California Academy of Natural Sciences, vol. i. p. 13, 1854.

Brosmius marginatus *Girard*, Explorations and Surveys for a Railroad Route, &c., vol. x. *Fishes*, p. 141.

Brosmophycis marginatus *Gill*, Proc. Academy of Natural Sciences of Phila., vol. xiii. p. 168, 1861.

Halias marginatus *Ayres*, Proc. California Academy of Natural Sciences, part 2, p. 52, 1861.

Brosmophycis marginatus *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 280.

Dinematichthys marginatus *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 375.

Hab.—California.

Synopsis of the Family of LYCODOIDÆ.

BY THEODORE GILL.

In the present article, it is desired to draw the attention of American marine zoologists to the species of this family, to call forth the search for any species of two of the genera hitherto only known from Greenland, or high northern seas; and also to embody the views regarding the affinities of the several genera, which have been widely scattered in the different ichthyological systems, and yet which appear to be connected by the closest ties.

Only the different species of *Enchelyopus* and *Gymnelis* are known to the author; acquaintance with *Lycodes* being confined to the descriptions and excellent figures of Reinhardt, Kroyer and Richardson.

Family *LYCODOIDÆ* (Günther).

Synonymy.

Zoarchidæ *Swainson*, Natural History and Classification of Fishes, Amphibians and Reptiles, vol. ii. pp. 184, 283, 1839.

Lycodidæ *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. pp. 317, 319, 1862.
Gadidæ and Ophidini pt. *Reinhardt.*
Blennioidei and Ophidoidei pt. *Bleeker.*
Blennioidæ pt. *Gill, Kroyer.*
Lycodidæ and Blenniidæ *Günther.*

Teleocephali with an elongated subanguilliform body, with the soft-rayed dorsal and anal fins confluent with the pointed caudal, invested like the body in a loose skin; the anus submedian or anterior, and with a raised margin; branchial apertures more or less restricted to the sides; minute jugular or obsolete ventral fins, and typically two rudimentary pyloric cæca.

This diagnosis is believed to embody the peculiar external characters which mark the group as a family, and all the types here included in it are evidently closely related. Reinhardt, who first made known two of the genera,—*Lycodes* and *Gymnelis*,—widely scattered them, referring the former to the Gobiidæ next to "*Zoarcœus*," between which and *Anarrhicas* it was said to be intermediate, while *Gymnelis* was placed in the family Ophidiini. Richardson, with his usual cautiousness in differing from others, followed Reinhardt, but expressed his opinion concerning the close affinity between *Lycodes* and *Gymnelis*. Kroyer approximated the three genera, referring them to the Blenniidæ next to *Clinus*.

Swainson, in 1839, proposed a family—"Zoarchidæ"—for fishes of the first order—Acanthopteryges,—having the body "anguilliform; dorsal, caudal and anal fins united; the rays soft." To the family so vaguely defined were referred the genera *Zoarces* and *Anarrhicas*. *Zoarces* has essentially the characters mentioned; but, as *Anarhicas* cannot be truly said to be either "anguilliform," or have the "dorsal, caudal and anal fins united," or "the rays soft,"—if by the latter term is meant articulated or branched,—it is not quite evident why the genus should have been placed in the family.

Günther has referred *Zoarces* to the Blenniidæ, although it has neither the spinous portion as much developed as the soft, or the whole fin composed of spines, nor is it destitute of pyloric appendages,* as required by his diagnosis of the family. On the other hand, the same gentleman has proposed a family Lycodidæ for *Lycodes* (including *Lycodes*, *Phycocætes* and *Ilyocœtes*),—*Gymnelis* and a new genus founded on a poor description of a species, called *Ophidium Parrii* by Ross. The family thus composed is said to bear "a strong resemblance to some of the Blennoid fishes, yet several of them show pyloric appendages; they have neither spines in the fins, nor a prominent anal papilla." In all such differential characters, *Zoarces*† agrees with the true Lycodidæ. But, while *Zoarces* is approximated to *Lycodes* and *Gymnelis*, it appears to be somewhat doubtful whether *Ilyocœtes* and *Phycocœtes* of Jenyns, as well as Günther's *Uronectes*, belong to the same family with them, notwithstanding the reference of the first two genera to the genus *Lycodes* itself.

The reviewer has heretofore suggested that "*Zoarces* and *Lycodes* form a peculiar family,"‡ but had previously, in the "Catalogue of the Fishes of the Eastern Coast," followed Reinhardt and Richardson in retaining them in the family of Blennioids. *Gymnelis*, which should have been approximated to them, was inadvertently omitted.

The following synopsis shows the distinctive characters of the several groups and genera:

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* Gunther, it is true, also refuses pyloric appendages in the diagnosis of *Zoarces* itself; but on examination of the European as well as American species, I find two developed, as in *Lycodes* and *Gymnelis*, in which he admits their presence.

† The posterior short spines or atrophied rays of the dorsal fin are not truly analogous to the spines of the dorsal fin, as is evident from their position.

‡ Gill, Proc. Academy of Natural Sciences of Phila., 1862, p. 501.

I. Ventral fins present in a rudimentary condition; pectoral with the axilla much nearer the back than the breast.
  α. Dorsal fin interrupted behind, and with its rays replaced by short spines ..... ZOARCEINÆ. Zoarces.
  β. Dorsal fin continuous ..... LYCODINÆ. Lycodes.
II. Ventral fins obsolete; pectoral with its axil nearer the breast than the back ..... GYMNELINÆ Gymnelis.

Subfamily ZOARCEINÆ Gill.

Synonymy.

Zoarceinæ *Gill*, Catalogue of the Fishes of the Eastern Coast of North America, &c., p. 45, 1860.
Anarrhicinæ pt. *Bon.*
Anarrhichadinæ pt. *Bon.*
Anarrhichæformes pt. *Blkr.*

Genus ENCHELYOPUS Gronovius.

Synonymy.

Enchelyopus *Klein*, Historiæ Piscium Naturalis promovendæ Missus quartus, p. 51, 1744.
Enchelyopus *Gronovius*, Zoophylaciæ Gronoviani fasciculus primus, p. 77, 1763.
Les Zoarcus *Cuvier*, Regne Animal, ed. 2, tome ii. p. 240, 1829.
Zoarcus *McMurtrie*, The Animal Kingdom of Cuvier, vol. ii. p. 176, 1831.
Zoarcæus *Epstrom.*
Zoarceus *Reinhardt*, Wiegmann's Archiv. für Naturgeschichte, 1837, b. i. p. 235.
Zoarchus *Swainson*, Natural History of Fishes, Amphibians and Reptiles, vol. ii. p. 283, 1839.
Blennius sp. *Linn.* et Linnæani.

Body elongated, subcylindrical anteriorly, compressed towards the tail, into which it gradually tapers. *Anus* in the second third of the length, with a moderately elevated periphery.

Scales minute, imbedded in the skin.

Head oblong, moderate and decurved in front to the snout. *Eyes* moderate, entirely in the anterior half of the head. *Nostrils* simple.

Mouth with the cleft little oblique and more or less deep; the supramaxillars extending mostly under or behind the eyes. *Jaws* nearly even.

Teeth subcylindrical and conic, pauciserial on the jaws. Palate smooth.

Branchial apertures rather large, oblique and extending forwards and downwards; separated by an isthmus little wider than the distance between the ventrals.

Branchiostegal rays six.

Dorsal fin commencing nearly above the pectoral fins, interrupted near its end for a short interval, where the rays are atrophied and replaced by very short, pungent spines; the short portion behind, as well as the anal, confluent with the caudal.

Pectoral fins moderate, inserted moderately high on the humeral arch, rounded behind.

Ventral fins moderately approximated, in advance of the pectorals, provided with three or four branched rays.

The type of this genus was placed among the *Blennii* by Artedi and Linnæus, and the naturalists of the true Linnæan school, as late as the early

years of the present century, although it was considered as the type of a peculiar genus by Gronovius as early as the year 1763. That erudite and sagacious ichthyologist accepted for it a name given by Klein to a heterogenous group, of which the species in question was one. It is therefore expedient to examine the group of Klein, more especially as his name has been employed for widely distinct genera.

It was in his fourth "Missus," and in the year 1744, that Klein introduced into the literature of the science the name *Enchelyopus*. He bestowed this name (ἐγχελευωπῶν) on fishes which he supposed to be analagous to, or "collateral" with, the true eels, but distinguished by their open or ample branchial apertures. To them were likewise attributed oblong, smooth opercula, of the consistency of more or less tough parchment, and readily compressible, and more or less elongated and cylindrical bodies. The species were distributed among two divisions,—those with an elongated dorsal, and those with a short one. The character of the genus *Enchelyopus* may be best learned by a knowledge of its contents. Those indicated by an asterisk (*) after the number of the species, are figured in Klein's work.

I. Enchelyopus *pinna dorsali longa.*

1.*Lepturus argenteus *Gill* ex *Shaw.*
2. Lepturus haumela *Gill* ex Forsk.
3. Lepturus.
4. Ophidion barbatum *L.*
5. Ammodytes tobianus *L.*
6.*Hyperoplus lanceolatus *Gill* ex *Les.*
7. Trachypterus iris *C.* et *V.*
8. Trachypterus tænia.
9. Trachypterus tænia *Bl.*, *Schn.*
10. Cepola rubescens *L.*
11.*Enchelyopus viviparus *Gronov.*
12.*Lota vulgaris *Cuv.*
13. " "
14. Molva vulgaris *Flem.*
15. Mastacembelus.
16. Rhynchobdella aculeata *Gthr.* ex *Bloch.*
17. Gempylus serpens *Cuv.*

II. Enchelyopus *pinna dorsali brevi.*

1. Misgurnus fossilis *Lac.*
2.* " "
3.*Nemachilus barbatula *Blkr.*
4. Cobitis tænia *L.*
5.*Gobio fluviatilis *Aq.*

It is not necessary to remind the ichthyologist who analyzes this genus of Klein, that it would be almost impossible to combine together as many species which should offer more numerous points of difference than the fishes thus associated. Representatives of eleven families,* most of which have little affinity to each, are thrown together in one heterogenous mass; nor is the group confined even within the limits of the vague diagnosis, for, although none of its members have the branchial aperture as restricted as the eels, still there is quite a wide difference in their extent between some of the species, such as the Cobitoidæ contrasted with the Lepturoids. Although it may not be allowable to criticize the fathers of science as if they had enjoyed the benefits of that knowledge which is the slow result of a century of labor, it will

* Lepturoidæ (1, 2, 3.) Ophidioidæ (4.) Ammodytoidæ (5, 6.) *Trachypteroidæ* (7, 8, 9.) *Cepoloidæ* (10.) *Lycodoidæ* (11.) Gadoidæ (12, 13, 14.) Mastacembeloidæ (15, 16.) Scombroidæ (17). Cobitoidæ (? II. 1, 2, 3, 4). Cyprinoidæ (5).

not be denied that Cuvier and Valenciennes were right in utterly denying to Klein the genius of a naturalist. Happy had it been for Icthyology—more happy still for Conchology,—had he never lived!

The name of Klein was revived in 1763 by Gronovius, and by him applied to a restricted group, composed of the twelfth species of Klein, and one which was for the first time made known. He restricted the genus with much precision, but did not include the posterior depression of the dorsal fin among the generic characters, mentioning that peculiarity of his first species as one of the specific distinctions. His second and only other species had an entire dorsal fin, the branchial apertures very ample, the ventral fins two-rayed, teeth equal, acute, remote, biserial at the front of the lower jaw, elsewhere uniserial ("solitarii"), D. 80. A. 60. P. 16. V. 2; it was said to inhabit the American sea. This is probably a Brotuloid related to *Brotula*, and has not been re-discovered.

As Klein specified no type for his genus *Enchelyopus*, and as his diagnosis agrees as well with *Zoarces* as any other type noticed or figured, and, finally, as he did not, more than the other zoologists of his time, regard the first species enumerated under his genera as types, Gronovius was justified in retaining *Enchelyopus* for the genus in question, since its first species was included by Klein in his own. The name of Klein and Grouovius must therefore, I think, be retained in place of *Zoarces*.

Klein's name was afterwards used by Schneider or Bloch and others, for different dismemberments of his genus; but, as all had been anticipated by Gronovius in its application, it cannot affect the question; and the objection made by Valenciennes to its employment for the genus called by him, after Cuvier, *Zoarces*, is therefore illogical.

Cuvier, in the second editiou of his Regne Animal, first established with exactness and characterized by the depression of the dorsal fin, the genus in question, and gave to it in its French form, (Les Zoarces,) the name which it has since, with more or less modification, borne. But, as the genus had already received a name, that of the great naturalist cannot be retained.

The choice assortment of modifications of the word *Zoarces* is doubtless due to the detestable plan adopted by Cuvier, in common with the other French zoologists of former years and still continued by a few, of giving only the French form of the name, instead of that belonging to the language of science. Naturalists will be precluded from adopting many genera first indicated by Cuvier on account of the preference thus evinced for giving them in the vernacular, for it is not the business of the savant to translate the popular, or even the pseudo-popular name which the author of any country chooses to employ, into its scientific equivalent. In the present case, however, the true form of the name happens to be the same as the French, as its etymology, (ζώαρκης,) indicates, and is preferable to those terminating in -us.

The genus *Enchelyopus*, as here adopted, has the same limits as the Cuvierian *Zoarces*, but it is probable that two distinct genera are confounded under it,—the American species being distinguished from the European by the larger head, much larger mouth, greater extent of the spinous portion of the dorsal fin, and the much larger number of caudal vertebræ. The name *Macrozoarces*, here used in a subgeneric sense, will doubtless have to be elevated to a generic one, and the American species named *M. labrosus*.

Subgenus MACROZOARCES Gill.

ENCHELYOPUS ANGUILLARIS Gill.

Synonymy.

Blennius anguillaris *Peck*, Memoirs of the Americau Academy of Arts and Sciences, vol. ii, pt. 2, p. 48, fig. 3.

Blennius labrosus *Mitchell*, Transactions of the Literary aud Philosophical Society of New York, vol. i. p. 375, pl. 1, fig. 7.

[Sept.

Blennius ciliatus *Mitchell*, op. cit., p. 374, pl. 1, fig. 6.
Zoarces labrosus *Cuvier*, Regne Animal, t. ii.
Zoarces labrosus *Cuv. et Val.*, Histoire Naturelle des Poissons, t. xi. p. 466, pl. 342.
Zoarces fimbriatus *Cuv. et Val.*, op. cit., t. xi. p. 468.
Zoarces anguillaris *Storer*, Report on the Fishes of Massachusetts, p. 66, 1839.
Zoarces anguillaris *Dekay*, Natural History of New York; *Fishes*, p. 155, pl. 16, fig. 45.
Zoarces fimbriatus *Dekay*, op. cit., p. 156, pl. 16, fig. 44.
Zoarces anguillaris *Storer*, Synopsis of the Fishes of North America, p. 123; ib. in Memoirs of the American Academy of Arts and Sciences, vol. ii. p. 375, 1846.
Zoarces fimbriatus *Storer*, op. cit., p. 123.
Zoarces labrosus *Cuv.*, Regne Animal, (ed. ill.) *Poissons*, pl. 79, fig. 1.
Zoarces anguillaris *Storer*, Memoirs of the American Academy of Arts and Sciences, vol. ii.
Zoarces anguillaris *Gill*, Catalogue of the Fishes of North America, p. 45, 1860.
Zoarces ciliatus *Gill*, op. cit.
Zoarces anguillaris *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 296.

Hab.—New York and New England coast.

The "*Zoarces anguillaris*," when allowed to remain some time in weak liquor, apparently represents the state called "*Z. fimbriatus*." Such change was apparent after a few weeks in a large specimen, received through the kindness of Mr. J. C. Brevoort, of Brooklyn.

Subfamily *LYCODINÆ* Gill.

Genus LYCODES Reinhardt.

Synonymy.

Lycodes *Reinhardt*, Kongelige Danske Videnskabernes Selskabs Naturvidenskabelige og Mathematiske Afhandlingar, deel vii. p. 153, 1838.
Lycodes *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 319, 1862.
Blennius sp. *Sabine*,
Zoarces sp. *Richardson*.

Body elongated, subcylindrical anteriorly, compressed towards the tail and gradually tapering. Anus subcentral, with a tumid border and a small papilla behind.

Scales minute or obsolete.

Head oblong, moderate, decurved in front to the snout. Eyes moderate, mostly or entirely in the anterior half of the head. Nostrils near the snout and above the maxillars; the anterior simple; the posterior tubular.

Mouth with the cleft scarcely oblique, little extending backwards, the supramaxillars ceasing under or before the front of the orbits. Lower jaw shorter and received within the upper. Lips large; the upper loose and continuous; the lower lobular or slightly pendant on each side.

Teeth in the jaws, vomer and palatine bones conical, mostly uniserial on the sides of the jaws and the palatines.

Branchial apertures rather large, almost vertical, in front of the bases of the pectoral fins and further, extending slightly above and below.

Branchiostegal rays five or six.

Dorsal fin commencing behind the bases of the pectorals, and, like the anal, continuous with the caudal uninterruptedly.

Pectoral fins moderate, obliquely rounded behind, inserted moderately high.

Ventral fins minute, with three or four rays.

Synopsis.

A. Pectoral fins with 18—22 rays.
  I. Body wholly scaly.
    α. Vertical fins scaly. Brownish yellow, with six slightly oblique, blackish bands as wide as the intervals behind the head, tending downwards and forwards. Head dark. D. 116—117. A. 91—95. P. 20. V. 4..... L. vahlii.
    β. Vertical fins naked. Brownish yellow, with anastomosing lines forming five reticulated bands behind the head. Head reticulated with similar lines. D. 93—95. A. 75. P. 20. V. 4..... L. reticulatus.
  II. Body only partly scaly.
    1. Body scaly in front, naked behind; fins naked. Yellowish, with eight brown bands, broader than their interspaces, behind the head. Head banded above, and with two round yellow spots on the crown. D. 80. A. 65. P. 19. V. 3..... L. perspicillum.
    2. Body naked in front, scaly behind; fins naked. Color uniform. D. 91. A. 71. P. 21—22. V. (3?) L. seminudus.
    3. Body naked anteriorly; scaly on the posterior part of the dorsal fin, not or scarcely on the anal. Brown, with transverse yellow bands across the back, but small and indistinct. D. 87. A. 68. P. 19. V. 3..... L. nebulosus.
  III. Body and fins wholly naked. Brownish black, with five narrow white bars across the back behind the head; the posterior largest, and spreading downwards. Abdomen and head below white. D. 90. A. 70. P. 18. V. 3..... L. mucosus.
B. Pectoral fins "having fifteen rays," with the length "exceeding twice its breadth," without any scales. Yellowish, "with eleven large saddle-shape markings across the back, the middle of these markings being much lighter than their edges; the whole back and the sides marbled..... L. polaris.

Lycodes Vahlii Reinhardt.

Synonymy.

Lycodes Vahlii *Reinhardt*, Kongelige Danske Videnskabernes Selskabs Naturvidenskabelige og Mathematiske Afhandlingar, deel vii. p. 153, tab. 5, 1838. *Gill*, Catalogue of the Fishes of the Eastern Coast, &c., p. 46, 1860. *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 319, 1862.

Hab.—Greenland.

Lycodes reticulatus Reinhardt.

Synonymy.

Lycodes reticulatus *Reinhardt*, op. cit., deel vii. p. 167, tab. vi. *Gill*, op. cit., p. 46. *Günther*, op. cit., vol. iv. p. 320.

Hab.—Greenland.

Lycodes perspicillum Kroyer.

Synonymy.

Lycodes perspicillum *Kroyer*, Oversigt over det Kongelige Danske Videnskabernes Selskabs, &c., 1844, p. 140. *Kroyer*, Voyage en Scandinavie, en Laponie, au Spitzberg et aux Faröe, &c., sur la corvette

"La Recherché," *Poissons*, tab. vii. *Gill*, op. cit., p. 46. *Günther*, op. cit., vol. iv. p. 320.
Hab.—Greenland.

LYCODES SEMINUDUS Reinhardt.

Synonymy.

Lycodes seminudus *Reinhardt*, op. cit., deel vii. p. 223. *Gill*, Cat., p. 46. *Günther*, op. cit., vol. iv. p. 320.
Hab.—Greenland.

LYCODES NEBULOSUS Kroyer.

Synonymy.

Lycodes nebulosus *Kroyer*, Oversigt over det Kongelige Danske Videnskabernes Selskabs, &c., 1844, p. 140. *Gill*, Cat., p. 46. *Kroyer*, Naturhistorisk Tidsskrift stiftet af Henrik Kroyer, udgivet af Prof. J. C. Schiodte, naepes iii. hafte ii. p. 293, 1862.
Hab.—Greenland.

LYCODES MUCOSUS Richardson.

Synonomy.

Lycodes mucosus *Richardson*, Last of the Arctic Voyages, p. 362, pl. 26, 1855. *Gill*, Cat., p. 46. *Günther*, op. cit., vol. iv. p. 320.
Hab.—Northumberland Sound.

LYCODES POLARIS Richardson.

Synonomy.

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. ccxii.
Zoarces polaris *Richardson*, Fauna Boreali-Americana, *Fishes*, p. 94.
Lycodes polaris *Richardson*, Last of the Arctic Voyages, p. 362. *Gill*, Cat., p. 46. *Günther*, op. cit., vol. iv. p. 321.

Subfamily *GYMNELINÆ* Gill.

Genus GYMNELIS Reinhardt.

Synonomy.

Gymnelis *Reinhardt*, Kongelige Danske Videnskabernes Selskabs Nat. og Math. Afhandlingar, deel vii. p. 130, 1838. Seq. Richardson, Kaup, Gill, Kroyer, Günther.
Cepolophis *Kaup*, Wiegmann's Archiv. für Naturgeschichte, 1856, band i. p. 96, 1856.
Gymnelis *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 323, 1862.
Ophidium sp. *Fabricius*.

Body naked, elongated and slender, compressed, especially behind the abdomen, and with the anus situated little behind the anterior third of the length, and with a moderate papilla.

Head oblong, rather small (one-sixth or seventh of total length), and declivous in front to the snout. Eyes moderate, entirely in the anterior half of the head. Nostrils single.

Mouth with the cleft moderately oblique and quite deep, the supramaxillars generally extending wholly under or behind the eyes. Jaws equal in front; lower oblong and rounded in front.

Teeth small and acute, pluriserial at the front of jaws, uniserial on the sides, as well as on the vomer and palatine bones.

Branchial apertures rather small, scarcely extending in front of the upper portion of the bases of the pectoral fins.

Branchiostegal rays six.
Dorsal and anal fins confluent with the caudal, and uninterrupted.
Pectoral fins fan-shaped, rather small, and inserted rather low.
Ventral fins obsolete.

The *Ophidium imberbe* of Linn., as understood by recent authors, and the *O. stigma* of Lay and Bennett, do not belong to this genus. The latter is distinguished by its scaly body.

GYMNELIS VIRIDIS Reinhardt.

Synonomy.

Ophidium viride *Fabricus*, Fauna Groenlandica, p. 141. *Bloch*, *Schneid.*, p. 486. *Ross*, *Reinhardt.*
Ophidium unernak *Lacépède*, Histoire Naturelle des Poissons, tome ii. p. 286.
Gymnelis viridis *Reinhardt*, Kongelige Danske Videnskabernes Selskabs Nat. og Mat. Afhandlingar, deel vii. *Kroyer*, Voyage en Scandinavie, en Laponie, au Spitzberg et aux Faröe, &c., sur la corvette "La Recherché," *Poissons*, tab. 15. *Richardson*, Last of the Arctic Voyages, p. 371, pl. 30. *Kroyer*, Naturhistorisk Tidsskrift Stiftet af Henrik Kroyer, udgivet af Prof. J. C. Schiodte, naepes iii. hafte 2, 1862. *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 323.
Cepolophis viridis *Kaup*, Archiv für Naturgeschichte.

Hab.—Greenland.

Descriptions of the GOBIOID genera of the Western coast of Temperate North America.

BY THEODORE GILL.

In the present article, detailed descriptions are submitted of three genera represented on the coasts of the Pacific United States. Although more than usually detailed, it is believed that no characters except such as are strictly generic are included; the brief references made to other genera will assist in obtaining an idea of the character of variation in the family. After having seen as numerous species as any of my predecessors, I am convinced that many natural genera are included under the name *Gobius*. A number of these have already been named, but others yet remain without designation.

The subfamily Gobiinæ is the only one so far known to be represented in the Californian and Oregon waters. Further south, the subfamilies Eleotrinæ, Sicydiinæ,* and Amblyopinæ occur.

Genus CORYPHOPTERUS Gill.

Synonymy.

Gobius sp. auct.

Body robust, considerably compressed, especially towards the back and caudal fin, with the anus considerably in advance of the middle; caudal peduncle oblong, high, and not contracted.

Scales regularly imbricated, large, more or less hexagonal, with the posterior margin pectinated, the nucleus at or near the posterior angle, and with striæ radiating thence towards the anterior margin; the scales cease near the nape.

Head scaleless, oblong, above nearly square and transversely arched behind the eyes; the sides compressed downwards; cheek scarcely tumid; snout oblique; eyes rather large, longitudinally elliptical, oblique, very closely approximated, and situated chiefly or wholly in the anterior half of the head;

* The Sicydiinæ are represented by four genera, *Sicydium*, (old world), *Sicyopterus* (new world), *Sicyopus* (without labial teeth, &c., and embracing *Sicydium rosterophorum* Bikr., and *S. balinense* Bikr.), and *Sicyogoster* Gill, (nec Barneville = *Gobiesox*.

opercula unarmed; operculum well developed, as long as or longer than the interval between it and the eye.

Mouth with the cleft oblique, longitudinal, the periphery of each jaw semi-elliptical, the supramaxillars under or nearly under the pupil; lower jaw slightly projecting beyond the upper; intermaxillars slightly protractile downwards, with the posterior processes moderate, and the lateral branches thick and attenuated towards their ends, but with a thin crest above; supramaxillars longer than the intermaxillars, behind the apophysis slightly twisted, nearly rectilinear, compressed and slightly expanded downwards behind, and produced towards the inferior angle.

Tongue rather thin, oblong, truncated in front, and free.

Teeth elongate, curved, acutely conic, pluriserial in front, continued to the angles of the mouth; enlarged and distant in front, in a row along the margin of each jaw; again increasing and bent backwards in the posterior row.

Branchial apertures lateral, nearly vertical, above bounded by a membrane attached in front of the axil of the pectoral; below continued forwards in a short slit between the fourth branchiostegal ray and breast.

Branchiostegal rays five.

Dorsal fins distinct; the first with six spines, all flexible, the third generally longest, the sixth remote; second oblong, generally increasing backwards, and with most of its rays having an anterior simple and a posterior forked branch; the last ray free.

Anal opposite and similar to the dorsal, nearly coterminal with it.

Caudal fin well developed, rounded behind.

Pectoral fins rounded behind, at the base subvertical and not continued to the plane of the breast, with its rays well defined, and, except one or two upper and lower ones, branched.

Ventral fins inserted below the base of the pectoral, very obliquely infurdifuliform, the inner rays longest and well connected; the interspinous membrane low.

Type, Coryphopterus glaucofrænum.

This genus is most nearly related among those hitherto named to *Ctenogobius* Gill, but is distinguished from that type by the short, robust body, the less abruptly decurved snout, the dentition and want of bent canines in the lower jaw in the male,* and the structure of the dorsal and anal fins.† The genus probably includes several species referred to *Gobius*, such as the Mediterranean *G. Lesueurii* Risso.‡

CORYPHOPTERUS GLAUCOFRÆNUM Gill.

The height of the body is contained about five times in the total length; the head about $4\frac{1}{3}$, and the caudal nearly the same. The head is not far from twice as long as high; the diameter of the eye enters nearly $3\frac{1}{2}$ times in the head's length, and is larger than the snout. The pectoral equals about a fourth, and the ventral about a fifth, of the total length; the dorsal and anal fins increase in height backwards, where they about equal the height of the body.

D. VI. 10. A. I. 9. P. 18.

There were apparently twenty-five vertical rows of scales, and seven longitudinal ones, between the dorsal and anal fins.

The body is tawny, with a faint blue spot in the centre of each scale, and with

* The presence of canine teeth in *Ctenogobius* is a sexual character; but in the new genus, these teeth are probably absent in both sexes.

† *Ctenogobius fasciatus* has six dorsal spines, although, by a typographical error, "V" has been assigned to it in the original description.

‡ In addition to *Gobius*, *Coryphogobius*, *Aphya*, and *Brachyochirus*, there are several other genera of European Gobies. *G. minutus* is the type of one (*Pomatoschistus*), distinguished by the small scales, extension of branchial aperture above, (a character hitherto unnoticed,) &c. *G. quadrimaculatus*, of another (*Deltentosteus*,) allied to *Coryphogobius*, but distinguished by the structure of the dorsal and anal fins and the triangular shape of the lower pharyngeal bones. Both have several species.

six spots formed by aggregations of dark dots on the ridge of the back, between the second dorsal spine and the axil of the soft dorsal fin; the first spot below the interval between the second and third spines; the second below that, between the fifth and sixth; the third between the dorsals; the fourth below the fourth ray; the fifth below the seventh, and the sixth below or behind the tenth or last. Another row of similar but fainter spots runs from the scapular region, and a third row along the middle of the sides on every third or fourth scale, while at the base of the caudal there is a spot above and another below the middle. The humeral region is bluish. The head is tawny, with three dark spots between the forehead and dorsal; a larger above the operculum, surmounted above by a blue dot; three blue dots below the oculo-scapular groove, the first two nearest and behind the eye, the third on the operculum. A straight blue line crosses the cheek above and slightly upwards, and is continued, after interruption, on the operculum; above and below it are dark dots, especially closely aggregated below, behind the angle of the mouth. The dorsal fins have a few faint blue spots.

A single specimen of this species, one inch and seven-tenths long, was obtained by Dr. Kennedy, the naturalist of the northwest Boundary Commission, in Washington Territory.

Genus EUCYCLOGOBIUS Gill.

Synonymy.

Eucyclogobius *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 279.
Gobius (Gd.) sp. *Girard.*
Lepidogobius sp. *Gill.*
Cyclogobius sp. *Steindachner.*
Gobius (L.) sp. *Günther.*

Body robust, subfusiform, compressed towards the caudal fin, with the anus scarcely in advance of the middle; behind very slowly decreasing in height towards the caudal peduncle, which is oblong, and not, or scarcely, contracted at its middle.

Scales regularly imbricated, small, cycloid, ovoid, with the nucleus behind the centre, with numerous radiating striæ diverging towards the front and sides, and with concentric striæ or wrinkles behind. The scales advance forwards nearly or quite as far as the nape.

Head scaleless, oblong, conoid, subquadrangular behind, and nearly as wide as high, above transversely convex in front of the nape and on the sides. Opercula compressed; cheeks scarcely tumid; snout oblique; eyes moderate, longitudinal elliptical, nearly lateral, rather distant from each other, and situated nearly in the middle of the anterior half of the head. Opercula unarmed; operculum well developed, nearly as long as the interval between it and the eye.

Mouth with the cleft oblique, longitudinal, the periphery of each jaw ovoid, the supramaxillars extending beneath the eye. Lower jaw nearly even with or scarcely projecting beyond the upper. Intermaxillars slightly protractile downwards, with the posterior processes short and wide, and with the lateral branches thick and attenuated towards the ends, but with a thin crest above (behind), along the posterior half. Supramaxillars nearly twice as long as the intermaxillars, with a compound apophysis in front, thence nearly rectilinear, but twisted, narrow, and only slightly dilated below towards the ends.

Tongue thick, emarginated in front, and free.

Teeth curved conic, pluriserial; those of the outer row of the upper jaw enlarged.

Branchial apertures lateral, nearly vertical, bounded above by a membrane attached in front of the axil of the pectoral fin; below continued forwards in a slit between the fourth ray and the breast.

Branchiostegal rays five.

Anal papilla moderate, oblong, and compressed.

Dorsal fins entirely separated; the anterior considerably behind the pectoral region, convex, and with seven or eight spines. The second oblong (I. 12), with its rays mostly simply bifurcated, and with the last free behind.

Anal fin shorter than the second dorsal, but even with it behind, and with its structure similar.

Caudal fin well developed, convex behind, and with numerous supplementary rays above and below its peduncle.

Pectoral fins wide, produced and rounded behind, with the base nearly vertical, but slightly concave, not extending below to the plane of the breast. The upper rays, like the others, are well defined and branched.

Ventral fins inserted below the bases of the pectoral, simply infundibuliform, with the inner rays longest and connected, and with the interspinous membrane low.

The genus *Eucyclogobius* is very distinct from *Lepidogobius*, differing especially in the robust, subfusiform body, the size and position of the eyes, wider forehead, shape of jaws, and especially the position of the ventral fins. Only one species is yet known.

Eucyclogobius Newberrii Gill.

Synonymy.

Gobius Newberrii *Girard*, Proc. Academy of Natural Sciences of Phila., vol. viii. p. 128, 1856. *Girard*, Boston Journal of Natural History, vol. vi. p. 539. Pl. xxv, figs. 5—8, 1857. *Girard*, Explorations and Surveys for a Railroad Route, vol. x. Fishes, p. 128.

Lepidogobius (Newberrii) *Gill*, Annals of the Lyceum of Natural History of New York, vol. vii. p. 14, 1858.

Gobius Newberrii *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. iii. p. 77, 1861.

Eucyclogobius (Newberrii) *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 279.

Eucyclogobius Newberrii *Gill*, op. cit., 1862, p. 330.

Genus LEPIDOGOBIUS Gill.

Synonymy.

Lepidogobius *Gill*, Annals of the Lyceum of Natural History of New York, vol. viii. p. 14, 1859.

Cyclogobius *Steindachner*, Beiträge zur Kentniss der Gobioiden *in* Sitzungsberichte der kaiserlichen Akademie der Wissenschaften, Math. Nat. Classe., Band xlii. p. 284, 1861.

Lepidogobius *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 330.

Gobius *Girard*, Explorations and Surveys for a Railroad Route, &c., to the Pacific Ocean, vol. x., Fishes, p. 127.

Gobius sp. *Günther.*

Body elongated, slender, compressed, with the anus in advance of the middle of the total length; behind very slowly decreasing in height towards the caudal peduncle, which is elongated, but scarcely narrowed at the middle.

Scales regularly imbricated, small, cycloid, ovoid, subtruncated in front, with the nucleus in the anterior half, and with numerous radiating striæ diverging towards the front and with concentric striæ behind; scales advancing forward above as far as the eyes, and on the sides to the suborbital region.

Head elongated, conoid, subquadrangular behind, and there about equally high and wide; above transversely convex, with the nape undefined, the scales advancing to the eyes; the opercula subvertical; cheeks not tumid, scaly

like the preoperculum and operculum; snout oblique. Eyes large, longitudinal elliptical, oblique, and closely approximated, situated chiefly or entirely in the anterior half of the head. Opercula unarmed; operculum well developed, as long as or longer than the region between it and the eye.

Mouth with the cleft oblique, longitudinal, the periphery of each jaw ovoid, the supramaxillars ending beneath the pupils. Lower jaw even or slightly projecting beyond the upper. Intermaxillars slightly protractile downwards, with the posterior processes short and wide, rounded at their ends: with the lateral branches thick and attenuated towards the ends, but with a thin crescentiform crest above, along the posterior half. Supramaxillars nearly twice as long as the intermaxillars, with a compound apophysis in front; thence nearly rectilinear, compressed, highest at the middle, again slightly enlarged and convex at the ends.

Tongue thick, emarginated in front, and free.

Teeth conic, curved, pluriserial; those of the upper jaw enlarged in the outer row. Palate smooth; vomer projecting.

Branchial apertures lateral, nearly vertical, bounded above by a membrane attached near the axil of the pectoral fin; below, continued forwards in a short slit between the fourth ray and the breast.

Branchiostegal rays five.

Anal papilla small.

Dorsal fins considerably separated; the first considerably behind the ventrals, oblong, convex at the middle, and with seven slender spines, between the last of which and the penultimate a wider interval exists. Second dorsal rather long (I. 19 pm.), with most of its rays with the anterior branch single and the posterior bifurcated. Last ray free behind.

Anal fin shorter than the dorsal (I. 16 pm.), but coterminal behind with it, and of similar structure.

Caudal fin well developed, convex behind, and with numerous supplementary rays above and below its peduncle.

Pectoral wide, produced and rounded behind, with the base little oblique, but extending nearly to the plane of the chest, with its superior as well as the other rays well defined and branched.

Ventral fins considerably behind the pectoral, very obliquely infundibuliform, the inner rays longest and well connected; the interspinous membrane low.

The genus *Lepidogobius* is readily distinguished by its elongated body, small cycloid scales, form of head, development of the fins, and especially by the posterior insertion of the ventral fins. A single species has been discovered; the *Gobius Newberrii*, formerly referred to it when known only through the description of Girard and the comparison instituted between it and *L. gracilis*, belonging to a distinct genus. The type of *Lepidogobius* has been placed by Dr. Günther in a section of Gobius characterized by having "the anterior dorsal with seven to nine spines." In this section, besides *Lepidogobius*, species of the genera *Eucyclogobius*, *Acanthogobius*, (nearly allied to *Awaous*, but having an increased number of spines and a scaly head), *Chæturichthys* R., and two Japanese genera have been placed. One of the latter genera, typified by *Gobius virgo* T.S., is distinguished by the long dorsal and anal fins (VIII. I. 25—27. A. I. 26.), very small scales, and the form of the head; it may be called *Pterogobius*. Another resembles *Gobionellus* Gd., but is distinguished by the increased dorsal and anal fins (D. VIII.—IX. 20. A. 17.), &c. It is represented by *Gobius hasta*, which may be called *Synechogobius hasta*.

LEPIDOGOBIUS GRACILIS Gill.

Synonymy.

Gobius gracilis *Girard*, Proc. Academy of Natural Sciences of Phila., vol. vii. p. 134, 1854.

Not Gobius gracilis *Jenyns*.

Gobius lepidus *Girard*, Explorations and Surveys for a Railroad Route, &c., vol. vi., Abbot's Report, Zoology, p. 21 (figured). *Girard*, op. cit., vol. x., Fishes, p. 127, pl. xxva, figs. 5-6. *Girard*, op. cit., vol. x. Williamson's Report, Zoology, p. 86.

Lepidogobius gracilis *Gill*, Annals of the Lyceum of Natural History of New York, vol, vii. p. 14, 1859.

Gobius lepidus *Günther*, Catalogue of the Acanthopterygian Fishes, &c., vol. iii. p. 78, 1861.

Lepidogobius gracilis *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 330.

D. VII. I. 19. A. I. 16. P. 24. V. I. 5+5. I.

The color is tawny or reddish-brown, (thickly dotted with blackish-purple when viewed under the magnifier); the snout, interorbital region and lips, purplish; the branchiostegal membrane dark purple. The fins are also purple, and thickly dotted with darker, especially between the rays.

On the GOBIOIDS of the Eastern Coast of the United States.

BY THEODORE GILL.

Subfamily *GOBIINÆ* (Bon.) Gill.

Genus GOBIUS Artedi.

Synonymy.

Gobius *Artedi*, Genera Piscium.

Gobius *Cuvier*, Régne Animal ed, tome ii.

Gobius *Cuv. et Val.* Hist., Nat. des Poissons, tome xii. p. 1.

Gobius *Günther*, Cat. Acanthop. Fishes, vol. iii. p. 3.

Body moderately elongated, subcylindrical anteriorly, slowly declining and compressed towards the caudal fin, with the anus little in advance of the middle of the total length, and with the caudal peduncle oblong and not or scarcely contracted at its middle.

Scales moderate, (in 35—55 transverse rows), more or less hexagonal, generally higher than long, pectinated behind, with the nucleus at or next to the posterior angle, and with radiating striæ diverging from it towards the anterior border; scales generally advancing forwards on the crown.

Head oblong, depressed, wider than high, slowly declining to the snout, and with the snout itself, in front, boldly decurved; above conical, rather rapidly narrowed to the snout, whose periphery is convex. Cheeks behind more or less tumid. Eyes moderate, longitudinal elliptical, oblique and looking upwards, closely approximated and situated almost, or wholly, in the anterior half of the head. Opercula unarmed. Operculum moderate, shorter than or equal to the internal between it and the eyes.

Mouth with the cleft longitudinal, ovoid, the supramaxillars under the pupils. Lower jaw even with, or rather shorter than the upper. Intermaxillars little protractile obliquely forwards, with the posterior processes short, the lateral branches thick, little attenuated backwards and above, with a thin elevated crest, generally truncated in front and decurved behind. Supramaxillars longer than the intermaxillars, slightly twisted, towards the ends compressed and decurved, and with a narrow expansion downwards.

Tongue moderate, rather thin, truncated and free in front.

Teeth fixed, acutely conic and curved, pluriserial, enlarged in the outer row. Palate smooth.

Branchial apertures lateral, vertical, bounded above by a membrane attached in front of the upper pectoral rays, below continued in a short slit between the fourth branchiostegal ray and breast; isthmus very wide.

Branchiostegal rays five; the fifth very thin and concealed in the membrane.

Dorsal fins distinct; the first scarcely oblong, with six spines, the last of which is remote; the second rather long, (I. 9—16), with the soft rays generally having an anterior simple and posterior forked branch; last ray free.

Anal fin shorter than the second dorsal, (I, 8—14), and ending under its last rays.

Caudal fin broad, rounded behind.

Pectoral fins well developed, produced and rounded behind, with the *upper rays short, deeply branched and filamentous or silk-like;* the rest well defined and normally branched.

Ventral fins inserted below the bases of the pectoral, obliquely infundibuliform, with the inner rays largest and well connected; the interspinous membrane low.

Type. Gobius niger *L.*

The genus *Gobius*, restricted as it has now been, still contains a number of species, two of which, are English—the *G. niger* L., and *G. paganellus*, L. upon which the generic characters have been especially verified. they being the types of the genus. A considerable difference exists in the development of the dorsal and anal fins, in different species of the genus.

Gobius caroliniensis Gill.

The height equals about a fifth of the total length; the caudal peduncle (from the vertical of the anal and dorsal fin to its end) forms about a sixth of the same, and its height equals a ninth. The head enters 4, 1-5 times in the length; its width six times; the diameter of the eye equals a quarter of the head's length and the length of the snout. The caudal fin forms about a fifth of the total length; the pectoral nearly equals the caudal.

$$\text{D. VI. I. } \frac{1}{8}\text{—} \qquad \text{A. L. } \frac{1}{7}\text{—} \qquad \text{P. 18}$$

There are about thirty-eight transverse rows of scales and fourteen longitudinal ones between the front of the second dorsal and origin of anal fin.

The color is blackish-brown, indistinctly bordered with darker, and with a darker spot at the base of the caudal fin. There are a few lighter spots on the operculum. The fins are purplish.

A single specimen has been sent from Charleston, South Carolina, to the Smithsonian Institution. The species is most closely allied to *G. soporator*, but differs in some of the proportions, especially the narrower caudal peduncle, and in the number of scales.

Genus GOBIOSOMA Girard.

Synonymy.

Gobiosoma *Girard*, Proc. Academy of Natural Science of Philadelphia, 1858, p. 169.

Gobiosoma *Günther*, Catalogue of the Acanthopterygian Fishes, &c. vol. iii. p. 85, 1861.

Gobius sp. *Lac., Mitch., Cuv. et Val.* &c.

Body scaleless, oblong, slowly declining and compressed towards the caudal fin, anus in advance of the middle, the peduncle oblong and not or scarcely contracted, with the back and abdomen trasversely rounded, and the sides subvertical.

Head oblong, depressed, much wider than high, declining slowly to the eyes, and thence boldly decurved to the edge of the rather high subtruncated snout; above subcordate, in front of the nape, (and preopercle), diminishing

in width to the snout, whose periphery is convex. Cheeks in front of preoperculum tumid.

Eyes rather small, longitudinal, obliquc, distant from each other and situated nearer the middle of the anterior half of the head. Opercular unarmed; the preoperculum hidden in a fleshy mass; the operculum higher than long.

Mouth scarcely longer than wide, and with the cleft scarcely oblique, the supramaxillars passing under most of the eye. Lower jaw rather shorter than the upper, intermaxillars little protractile downwards, with the posterior processes short and the lateral branches thick, little attenuated backwards, and without crests. Supramaxillars longer than the intermaxillars, slightly twisted and curved, compressed behind and *surmounted by a longitudinal keel* below which the expansion takes place, and at whose end the bone is convex.

Tongue moderate, oblong, truncated and free in front.

Teeth fixed, slender, curved and acute, pauciserial, enlarged in the outer row. Palate smooth.

Branchial apertures lateral, nearly vertical, bounded above by a membrane attached in front of the upper pectoral rays, slightly curved forwards below; isthmus very wide.

Branchiostegal rays five.

Dorsal fins distinct; the anterior oblong, normally with seven slender spines, the last two remote from each other and the preceding. Second dorsal oblong, (I. 10—12), with its rays generally having an anterior simple and posterior forked branch; the last ray free.

Anal fin oblong, (I. 10—12), smaller than the second dorsal and extending less backwards, but of similar structure.

Caudal fin convex behind.

Pectoral fins well developed, convex behind, with the rays distinct and almost all branched.

Ventral fins inserted below the bases of pectoral, rather small and obliquely infundifuliform, the inner rays longest and well connected, the interspinous membrane low.

The genus *Gobiosoma* is apparently peculiar to North America, and is represented on both the Eastern and Western coasts. The foreign species referred to it belong to several genera, the *Gobius macrognathus* Blkr. of Japan, differing in the form of the head, &c., may be named *Gymnogobius*; the *G. ophiocephalus* Jenyns, in form and development of fins, *Ophiogobius*; the *G. Nilssonii* D. & K., distinguished by the biradiate first dorsal, may take the name *Crystallogobius*, and *G. stuvitzii* D. & K., *Boreogobius*.

GOBIOSOMA ALEPIDOTUM (Girard.)

Gobius alepidotus, *Lac.*
Gobius viridipallidus, *Mitch.*
Gobius Boscii, *Cuv. et Val.*
Gobius alepidotus = Gobiosoma sp. *Girard.*
Gobiosoma alepidotum, *Günther.*
D. VII.
Hab.—New York to South Carolina.

Subfamily *ELEOTRINÆ* (Bon.) Gill.

Genus DORMITATOR Gill.

Synonymy.

Dormitator *Gill*, Catalogue of the Fishes of the Eastern coast of North America, &c., p. 44 (named only.)
Dormitator *Gill*, Proc. Academy of Natural Sciences of Phila., 1862, p. 240.
Eleotris Sp. auct.
Prochilus *Cuvier*, Règne Animal ed. i. tome ii. p. 294

Body moderately elongated, subfusiform, compressed, especially behind the anus, which is situated a little in advance of the middle of the length; caudal peduncle oblong and contracted towards the middle, but slightly narrowed towards the caudal fin.

Scales regularly imbricated, moderate in size, hexagonal, but apparently rather pentagonal, generally higher than long, with the posterior margin pectinated, the nucleus at or next to the posterior angle, from which striæ radiate towards the anterior border; the scales advance on the head.

Head scaly, the scales advancing forwards above to the snout, and covering the cheeks and opercula, cycloid and smaller above and on the cheeks; the head is rather small, considerably compressed and much higher than wide, nearly uniform in width, declining downwards to the snout; the latter is convex, and its periphery arched; the whole upper surface is convex and fleshy; the cheeks scarcely tumid. Eyes rather small, subcircular, entirely lateral, widely separated, and situated in the anterior half of the head. Opercula unarmed; operculum fully developed, its length being nearly twice as great as the interval between it and the eye.

Mouth with the cleft oblique, transverse, the periphery of each jaw semicircular, the supramaxillars ceasing nearly under the front of the orbit. Lower jaw nearly even with the upper. Intermaxillars, little protractile downwards, with the posterior processes short and wide, (connected), and the lateral branches thick and attenuated backwards, but near the ends with a thin, convex expansion above the posterior half. Supramaxillars longer than the intermaxillars, narrow, twisted, little curved, and behind compressed, and with a slight expansion downwards.

Tongue fleshy, moderate, subtruncated in front and free at its tip.

Teeth slender, conic, in a narrow band in each jaw, *moveable in the external row in the lower.* Palate smooth.

Branchial apertures lateral, nearly vertical, continued above in a short slit of the oculo-scapular groove, below curved slightly forwards between the membrane and throat; isthmus moderate.

Branchiostegal rays five.

Anal papilla long and compressed.

Dorsal fins two, the first generally with seven (6-8) spines, the anterior nearly uniform; the second, short and high, (I. 8—9); the rays generally, with the anterior branch simple and the posterior forked; the last ray free behind.

Anal fin nearly opposite and similar to dorsal.

Caudal fin large, convex behind.

Pectoral fins well developed, equally convex behind, with the rays well developed, and only one or two upper and lower ones simple.

Ventral fins inserted below the base of the pectoral, closely approximated but entirely free; each with five rays, the fourth of which is longest.

This genus is well distinguished by the combination of characters above given, especially the large scales, compressed and nearly uniformly wide declivous head, and the extension forwards of the branchial apertures above.

The genus *Eleotris*, from which the present is detached, as understood by Cuvier and his followers, appears to be rather entitled to the rank of a subfamily than to that of a genus. Valencinnes has distinguished the genus *Philypnus*. Bleeker recognizing the difference of many of the types referred to it, even after such restriction, has proposed to separate from it *Culius*, *Butis*, *Valenciennea* (= Eleotriodes) and *Belobranchus*; Poey has founded *Erotelis* and the writer has established the genera *Bostrichthys* and *Dormitator*. After all these dismemberments, there still remain, as types of distinct genera, the *Eleotris ophiocephalus C. et. V.* (genus OPHIOCARA); *E. Mogurnda* Rich. (g. MOGURNDA); *E. gobioides* (g. GOBIOMORPHUS); *G. cyprinoides* (g. HYPSELEOTRIS); *E. macrodon* Blkr. (g. ODONTELEOTRIS); *E. strigata* C. et V. (g. CALLELEOTRIS) and *E. mi*

crolepis, Blkr. (g. PTERELEOTRIS), and perhaps still others. These various genera are distinguished by the form of the body, length of the fins, the form of the caudal, that of the head, the dentition, extent of branchial apertures, number, &c., of brauchiostegal rays and size of scales.

DORMITATOR LINEATUS Gill.

Dormitator somnulentus *Gill*, Catalogue of the Fishes of the Eastern coast of North America, p. 44.

Not Dormitator somnulentus *Gill*, ex. *Gd.*

The height enters about $4\frac{1}{4}$ times in the total length; the head about $4\frac{1}{3}$ times; the diameter of the eye about equals the snout and two-uinths of the head's length. The caudal forms a fourth of the length; the pectoral equals a fifth; the ventral does not extend to the anus, and is rather shorter than the pectoral.

D. VII. I. 10. A. I. 10. P. 14.

There were, apparently, thirty-one or two oblique rows of scales, and nine longitudinal ones between the origin of the second dorsal and the anal.

The color is brownish-yellow, thickly punctulated with darker, with a dark line running along the middle of each row of scales, and with a dark vertical blotch on the scapular region. The head had, apparently, two dark longitudinal bands. The dorsal aud aual fins have two rows of darker spots on the basal half, and a fainter one beyond; they are also like the other fins, punctulated with minute darker dots.

A single specimen, about three inches long, is in the collection of the Smithsonian Institution, aud was sent from Savannah, Georgia. It was referred to as *Dormitator somnulentus* in the "Catalogue of the Fishes of the Eastern coast," but it differs from that species in color, as well as slightly in proportions.

On the genus PERIOPHTHALMUS of Schneider.

BY THEODORE GILL.

In examining the different species of the genera *Periophthalmus* and *Boleophthalmus*, attention was arrested by the very trenchant differences existing between the *Periophthalmus Kœlreuteri* and *P. Schlosseri*, which indicated generic distinction. It is therefore proposed to restrict the name *Periophthalmus* to the species having the characters indicated in the following diagnosis, while for the *P. Kœlreuteri* the generic name *Euchoristopus* may be employed. The *Periophthalminæ* may be distributed as follows:

I. Teeth of jaws vertical, D. (IV—XV.) I. 11—12. A. I. 10—12.
  α. Scales on head and body well developed and conspicuous. Second dorsal and aual fins nearly equal. Ventral fins in adult nearly infundibuliform..... Periophthalmus.
  β. Scales on body and head minute. Anal fin contracted. Ventral fins always distinct..... Euchoristopus.

II. Teeth of the lower jaw horizontal. D. V. I. 24—27. A. L. 23—25.
  α. Scales small but conspicuous..... Boleophthalmus
  β. Scales very minute, inconspicuous or obsolete in front. (*Bol. aucupatorius* Rich.)..... Boleops.

Genus PERIOPHTHALMUS (Bl., Schneid.)

Body much compressed, with the back rectilinear, gradually declining to the caudal fin, to which the rectilinear inferior outline converges still more slowly. Anus submedian.

Scales minute, cycloid, regularly imbricated.

Head little longer than high, ascending from the nape to the interorbital region, in front of which the profile is very steep; below plane. Eyes prominent, separated by a narrow furrow. Border of skin above mouth with a triangular flap on each side of the middle. Scales minute, like those of the body.

Mouth moderate, with the periphery semioval, the supramaxillars terminating under the pupils. Lower jaw most advanced. Upper lip very wide, especially at the sides; lower free only near the angles of the mouth.

Teeth erect in both jaws, uniserial, acutely conic; above a large median one in front, and one on each side, between which and the former small teeth like those of the sides intervene; in the lower jaw two large teeth in front, separated by a wide, smooth interval, and on the sides a row of small ones.

Branchial apertures small, in front of the lower half of the arm.

Branchiostegal rays five.

Dorsal fins separated by a short interval; the spinous above the pectoral fin, higher than long, with ten to fifteen slender, divergent spines: the second oblong, and with about twelve rays.

Anal fin short and low, under the middle of the second dorsal, with ten or eleven rays.

Caudal fin behind convex at the upper half, at the lower half very rapidly curved forwards.

Pectoral fins inserted on large free arms narrowed towards their bases, the fin nearly or quite scaleless, with the upper rays rapidly increasing in a curved line to the eighth, and the lower gradually shortened, their ends defining a moderate curve.

Ventral fins thoracic, under the bases of the arms, separated by a narrow, triangular area, which ends between their inner rays in a point; each has a spine and five rays increasing toward the inner, their ends describing a curve.

Type Periophthalmus Kœlreuteri Bl., Schn.

Distinguished for the size of the scales, form of the head, dentition, size of branchial apertures, form of anal fin, free arms, and persistent separation of the ventral fins.

Note on the genera of HEMIRHAMPHINÆ.

BY THEODORE GILL.

Valenciennes, in the nineteenth volume of the "Histoire Naturelle des Poissons," has especially alluded in many cases to the dentition of the various species of the genus *Hemirhamphus*, describing the teeth as "very short, blunt and conic, or rather granulated," (*H. Brownii* C. et V. lix., p. 16,) finer in some, coarser in others; in the observations on the genus, the following characters are given: "Les deux machoires sont garnies d'une bande étroite de petites dents courts, grenues et égales," (C. et V. xix., p. 2.)"Il faut aussi remarquer que les dents restent toujours petites et égales, tandis qu'elles s'allongent, comme ou le sait, dans les orphies." Trusting in the correctness of Valenciennes, I formerly proposed a new generic designation for a species of the tribe, with tricuspid teeth, found at the island of Barbados. As subsequent examination of numerous specimens from the West Indies and elsewhere has, however, failed to discover a dentition among the typical Hemirhamphi like that described by Valenciennes, I am compelled to believe that he is in some cases, if not in all, incorrect; after the arrival at this conclusion, it is easy to believe that the *Hyporhamphus tricuspidatus* may perhaps be identical with the *Hemirhamphus Richardi* of Valenciennes, the teeth of which are, however, described as being finer and in a wider band than in any other. Again, as the

H. Richardi is probably very nearly allied to, and perhaps even identical with the *Esox brasiliensis* L., the type of the genus *Hemirhamphus* of Cuvier, the name *Hyporhamphus* should probably be suppressed. If this identification then is correct, a new name should be conferred on the species with conic teeth. This question, as well as that of the proper name of the genus, will be hereafter discussed.

The genus *Hemirhamphus* of Cuvier is not a homogeneous one, but embraces at least four distinct generic types distinguished as follows:

A. Body with the back and abdomen parallel; lower jaw very long, uniform and depressed.
  I. Caudal fin forked, and with the lower lobe longest.
    1. Teeth tricuspid above and below; bill moderate; dorsal and anal pluriradiate; pectorals moderate; ventrals moderate ..... Hemirhamphus.
    2. Teeth conic above, tricuspid below; bill very slender; dorsal and anal pluriradiate; pectorals very long; ventrals small ..... Euleptorhamphus.
  II. Caudal fin convex behind. Anal fin of male with some thickened rays ..... Zenarchopterus.
B. Body subfusiform; lower jaw acutely cuspidute ..... Oxyporhamphus.

The type of *Hemirhamphus* Cuv. is *Esox brasiliensis* Linn.; of *Euleptorhamphus* Gill (1860,) *E. Brevoortii;* of *Zenarchopterus*, *Hemirhamphus dispar* C. et V. (xix. p. 58, pl. 558) and of *Oxyporhamphus*, *Hemirhamphus cuspidatus* (C. et V. xix., p. 56, pl. 557.) The last is only known to me through the description and figure given by Valenciennes.

On STREPOMATIDÆ as a name for a family of fluviatile Mollusca, usually confounded with Melania.

BY S. S. HALDEMAN.

In the American Journal of Science, vol. 41, 1841, in my monograph of Leptoxis, 1845, and in the Iconographic Encyc., I pointed out the necessity of distributing the heterogeneous Melaniæ of Lamarck into two separate families, according as the margin of the mantle is festooned, as in the species of the Pacific Islands, or simple, as in the North American species. Knowing the two forms to be distinct, I proposed, in accordance with the position assigned by Lamarck to his family Mélaniens, to restrict the name *Melania* to the American group; but as the oriental species were best known in Europe when the genus was instituted in 1801, and as Deshayes (following Bruguière, Férussac 1807, and Rang, Mag. de Conch., pl. 12,) described the animal of *Melania*, or *Pirena*, as having a festooned mantle, (in his edition of Lamarck 8,427; 1838,) followed by others, as H. and A. Adams, who give "mantle margin fringed" as a character, European naturalists were averse to giving up the name for the oriental group; and as it is a matter of little scientific importance, if the *families* are properly recognised, I now reluctantly yield it to the oriental form, and consequently withdraw the American species from it.

In thus giving up the *name* of *Melania* as applicable to American species, it must not be forgotten that Lamarck's family of Mélaniens includes the three genera *Melania*, *Melanopsis*, and *Pirena*, and that from its position in his system, and the structure of the European Melanopsides, he would not have included the species (like the oriental *Melania amarula*, or the African *Pirena aurita*,) with a festooned mantle, which have gradually become the representatives of "Melania," from the accidental circumstance that the mollusc was first described from them. The fact that Lamarck commences his series with the

large oriental species, is of little value, as he commences the genus Planorbis with *cornuarietis*, a discoid *Ampullaria*.

Conchologists of good repute, as H.-A. Adams, Brot, Carpenter, Deshayes, Gould, and Lea, continue to place the two groups under the same family name of Melanidæ (d'Orbigny) or its equivalent, which is much like uniting *Patella*, *Lottia*, and *Ancylus*, because they have analogous shells. The uncertain position which these groups hold is apparent in the paper of Mr. Gill, in the Proceed. Acad. Nat. Sci. for Feb., 1863. He there includes the Melaniidæ in his "Synopsis of the families of Pectinibranchiates represented in the fresh-water streams of North America," although he admits (note under Amnicolidæ) that they "have *not* a fringed mantle, and consequently belong to a *different* group" from the "true Melanians." How then can they be Melaniidæ? Of this group he forms "a peculiar *sub*family,—*Ceraphasiinæ*." From his heterogeneous Melaniidæ he rejects certain forms, including *Melanopsis* and *Pirena* (probably *P. atra* (Linn.) and *P. fluminea* (Gmel.,) to form a family Melanopidæ (and also a subfamily Melanopinæ,) to which his Cera(Ceri-?)phasiinæ should belong, as Melanopsis seems to have a simple mantle; apparently leaving *Pirena aurita* in his North American Melaniidæ. Mr. Carpenter (Smithsonian Report for 1860,) not only unites the oriental and North American species, but he assigns a fringed mantle to the latter.

In the Iconographic Encyc., I placed Melaniidæ (the American form) at the head of the Ctenobranchia, followed by Cerithiidæ (including the oriental Melaniæ,) Vermetidæ, Trochidæ, &c. *Melania* proper, with a festooned mantle, seems to form a subfamily Melanianæ of the family Cerithiidæ, and the following species are examples:

M. celebensis *Quoy*, Astrolabe, p. 152, pl. 56, f. 28.
M. costata *Quoy*, " p. 155, " f. 36.
M. cybele *Gould*, Am. Ex. Exp., p. 132, fig. 154*b*.

Virginia is given as the locality of *M. fuscata* Born, (Helix) Desh. Lam. 8,436, which is probably an error. Of Lamarck's sixteen recent species, *M.* (*Pleur.*) *carinifera* is the only one from North America, and Say's *M.* (*Pleur.*) *depygis* is the only one among the twenty added by Deshayes.

Rafinesque proposed three genera of this fluviatile family,—*Strepòma*, *Pleurócera* and *Leptoxis*. The last was subsequently described as *Anculosa* Say, the first as *Ceriphasia* Swainson, (adopted by H.-A. Adams,) and *Trypanostoma* Lea, leaving *Pleurocera* for the varied forms constituting the remainder. But from this remainder I separated *Lithasia* for shells like *Mel. nupera;* and *Angitrema* for the form including *Mel. armigera*, which leaves *Pleurocera* about equivalent to *Goniobasis* Lea, and to several of the genera proposed by H.-A. Adams, as *Melasma*, *Elimia*, *Juga*. Thus *Juga* includes (*Pleur.*) *Virginica* Say, (inadvertently placed under *Ceriphasia* also,) whilst Rafinesque's *Pleurocera turricula* is a slender shell, like (*Pl.*) *acuta* Lea, or *exilis* Hald.

I now propose that *Strepòma* and *Pleurócera* shall replace their synonyms, the former as a genus, the latter as a subgenus in the family Strepomatidæ. The groups of Messrs. H.-A. Adams often indicate merely sections; and sectional names given as generic are scientifically erroneous, because they erect certain species into genera and subgenera only when they belong to extensive groups, requiring numerous specific names, whilst the same amount of character goes for nothing in groups which have but few species.

All the species of Strepomatidæ which I have examined living (including *Io*) have the mantle simple and the opercle subspiral. This is the case with *Strepoma canaliculata* (Say,) the type of the first division of "Melania" in Dr. Brot's admirable Catalogue. . . . des Mélaniens, Genève, 1862. In some species of *Leptoxis* the adult opercle seems to have a different structure, but this arises from erosion of the earlier subspiral portion, as may be ascertained by comparing the different ages.

[Sept.

Oct. 6*th.*

Mr. Vaux, Vice-President, in the Chair.

Twenty-two members present.

Oct. 13*th.*

Mr. Vaux, Vice-President, in the Chair.

Twenty-six members present.

Mr. Aubrey H. Smith stated that recently, in company with Dr. Leidy and Mr. Charles E. Smith, he had found in a grove, in New Jersey, about four miles out on the Camden and Atlantic Railroad, a well grown, and perfect specimen of Quercus heterophylla. He also remarked that previously, in company with Dr. George Smith, he had noticed a tree of the same kind, though not quite so well marked, in Tinicum, Delaware Co., Pa.

Mr. Durand made a communication, which was ordered to be published, as follows:

When false views pertaining to one of the branches of the natural sciences are spread before the public, either in good faith or with a view to speculation, I consider it to be the duty of an institution like ours to interfere, and bring the weight of its influence to counteract the diffusion of an error.

A printed circular has been issued, emanating from a chartered company, entitled "American Tea Company," and purporting to be an announcement that the *Chinese Tea-plant*, or a variety of it, has been found growing indigenous in the mountainous districts of Pennsylvania.

In this circular, which appears to be the programme of the originators of the American Tea Company, these gentlemen declare that, "upon a thorough investigation of the subject, they could not withhold their entire conviction that this discovery of the Tea-plant, growing indigenously upon our own soil, hardy, vigorous, and with a leaf of superior excellence, was not only a fact, but look upon it as one of the most surprising bestowments ever vouchsafed by Almighty God to the people of the United States!"

This solemn assertion is countenanced by the following declaration of a gentleman who, for about six years, held the responsible position of superintendent and chief manager of the lands, in India, of the Assam Tea Company of London and Calcutta. The following are his words:

"Having been engaged, for several years, in the culture and manufacture of tea, in the Valley of Assam, situated to the west of the province of Yunnan, one of the principal tea-growing districts of China, I wrote an article on the subject, which was published in the Agricultural Report of the U. S. Patent Office for the year 1860. Since that time, several enterprising gentlemen, discovering that the Tea-plant was indigenous to this country and growing in wild profusion in the mountainous regions of Pennsylvania, called my attention to the subject. At first I had some doubts as to the fact of its existence in this climate; but having been shown an excellent engraving of the plant and some specimens of the dried leaves, I became convinced of its truth, and, on proceeding to the locality indicated, I found that my hopes and expectations were more than realized. *The existence of the Tea-plant in Pennsylvania is a fact!* It grows indigenously, in the greatest luxuriance and abundance, in the places that I have visited, limited, however, to those localities which afford the peculiar soil indispensable to it, as it is the case in China, Assam and Japan."

(The plate accompanying the circular is inscribed, "The Tea-plant of North America—Chinese Chah, Assamese Phalop—*Thea viridis*, Linn.")

There is no equivocation whatever in the preceding paragraphs, nor in the inscription of the plate! The originators of the American Tea Company proclaim to the people of the United States "that they have discovered the Chinese Tea-plant,—*Thea viridis*,—growing indigenous, in the greatest luxuriance and abundance, in the mountainous districts of Pennsylvania."

This is a gross error, which, as a botanist and one acquainted with the mountainous districts of Pennsylvania, I now desire to correct. *That the true Tea-plant, Thea viridis, or any of its varieties, have ever been detected growing indigenously in the mountains of Pennsylvania, I deny most emphatically!* and I challenge the gentlemen of the American Tea Company to prove the fact which they announce as one of the most surprising bestowments ever vouchsafed by Almighty God to the people of the United States.

Could it be possible that a plant so well known under cultivation in our hot-houses should have escaped the sagacity and experience of such active and eminent botanists as Michaux, Pursh, Muhlenberg, Schweinitz, Nuttall, Pickering, Porter, and a host of excellent Pennsylvania botanists, who have explored every nook and corner of our mountain forests, without ever finding a single plant of the *Thea viridis*, which the originators of the American Tea Company boldly assert to have found growing *indigenous*, *hardy*, *vigorous* and *abundant*, almost at our doors?

By this emphatic declaration of mine, I have no intention to impeach the good faith of these gentlemen; they have been mistaken, no doubt, and my object, as a botanist, is to correct a misrepresentation which might lead credulous persons into serious miscalculations. No botanist will ever look at the figures of the plate accompanying the circular, or take the trouble to steep in boiling water and unfold the leaves of the American tea, without easily recognizing those of a small shrub,—*Ceanothus Americanus*,—very common in our woods, and popularly known by the name of *Jersey tea*, under which it was used during the Revolutionary War,—*not as genuine Chinese tea*, however, but as *a substitute* for it, when the latter could not be easily procured.

Had the figures of the plate of the American Tea Company been provided with flowers and fruit, as they ought to have been, in order to characterize the plant, the gross error of these gentlemen would have been more glaring. Instead of the large, solitary, or geminate flowers of the Chinese tea-plant, they would have exhibited cymose fascicles of numerous very small flowers, supported on a common peduncle much longer than the leaves.

I now submit to your inspection dry and green specimens of different forms of *Thea viridis*, with figures of the same plant, that they may be compared with specimens of *Ceanothus Americanus*, the plant which I have every reason to consider as that which is represented in the plate of the American Tea Company. I will also show you leaves and fragments of leaves of both Chinese and American teas, that have been steeped in boiling water, and afterwards unfolded and pasted separately upon paper. You will here easily distinguish the peculiar and invariable characters of the leaves of each of these plants, so different from each other.

The Chinese plant, as well as its varieties, is a shrub from three to six feet high, and sometimes higher, which belongs to the *Camellia* family. It is distinguished by large polyandrous flowers, solitary or geminate in the axils of the leaves; sepals from five to six; petals five, six, and rarely as many as nine, slightly united at the base; stamens numerous and monadelphous; three united styles; capsule three-celled. The leaves are *persistent, oval or narrow-lanceolate, feather-veined, strongly serrate, and attenuated at the base.*

The Jersey-Tea plant is an undershrub of the order *Rhamnaceæ*, scarcely more than two feet high, with very small perigynous flowers in cymose fascicles; sepals and petals five-parted; stamens five; one style and a three-lobed dry

drupe. The leaves are *ovate or oblong-ovate, broad and rounded at the base, sometimes almost subcordate, finely serrate, and three-ribbed.*

Extracts from the essay on Tea Culture, by the author of the fifth paragraph above, have been introduced into the circular of the American Tea Company; the first of which is worded in the following manner:

"The Tea-plant is thus described by botanists:

"*Thea viridis*, Linn., *Camellia theifera*, Griff., *Chinese Chah*, *Assamese Phalop.*

"The ordinary height of the cultivated plant is from three to six feet."

This concise and very curious botanical description was, it appears, just enough for the present purpose. Had the more detailed account of the plant, given three years ago in the essay on Tea-culture, been reproduced in full, more information would perhaps have been given than was intended.

The second extract runs thus: "Botanically considered, the Tea-plant is a single species; the Green and the Black, with all the diversities of each, being mere varieties produced by a difference in culture, qualities of the soil, age of crops, &c." Evidently this extract is the corollary of one of the paragraphs of the circular, in which the same author insinuates that, "although the character of the American Tea-plant differs somewhat from the Chinese variety, it is not greater than might be expected from the difference of climate and soil of the two countries."

I will inform the gentleman that difference of climate and soil, and even difference of hemisphere, (although occasionally producing slight changes,) will never transform a plant of the *Camellia* tribe into one of the Buckthorn family. Referring to the leaf alone, "which," he says, "is the important part, and almost identical with some of the varieties from which the best Assam tea is made," I will add that, far from being almost identical, they are very different; the leaf of our *Ceanothus* being deciduous, of a thin texture, more or less pubescent, strongly three-nerved, and rounded at the base; whilst in all the varieties of *Thea viridis* the leaf is thick, coriaceous, persistent, quite glabrous, with a single feather-veined rib, and attenuated at the base. I must confess that the remark of an almost identity of the leaves of our plant with those of the Chinese Tea-plant, had induced me for a moment to suspect that the species *Ceanothus Asiaticus*, a plant indigenous to south-eastern Asia, and very similar to our *Ceanothus*, was also used in Assam as an auxiliary, if not a substitute, to *Thea viridis.*

I have now done with the subject. My purpose was merely to discuss the botanical value of the assertion of the originators of the American Tea Company, viz.: that the tea which they intend to offer to the public, was derived from the "true Chinese Tea-plant, growing indigenously, luxuriantly, and abundantly in our mountains," invisible, so far, to our numerous and active botanists. I trust that I have convinced you of the fallacy of this assertion.

I leave it now to the chemist to test the identity of chemical composition of this American tea with the *Chinese Chah*, and ascertain whether the former contains tannin, gluten, and thein, three of the principles which characterize *Thea viridis.*

Oct. 20th.

Mr. VAUX, Vice-President, in the Chair.

Twenty members present.

The following were presented for publication:

"Description of a new species of Pleurocera," "Description of two new Mexican Land Shells," and "Description of a new Teredo." By George W. Tryon, Jr.

1863.]

Oct. 27th.

The President, Mr. LEA, in the Chair.

Thirty-two members present.

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

Description of a Collection of JASPER "LANCE-HEADS" found near Trenton, New Jersey; and Remarks on the Locality, with reference to Indian Antiquities.

BY CHARLES C. ABBOTT.

During the summer of 1861, a farmer, while engaged in plowing an artificially drained piece of meadow, near Trenton, New Jersey, discovered a large collection of jasper "lance-heads," buried at a distance of about fifteen inches below the surface of the ground. The author visited the spot shortly afterwards, and has lately secured the collection; a portion of which is now in the possession of the Academy.

The collection numbers about one hundred and fifty specimens; they having been all carefully gathered when exhumed. They are of such shape as renders the term "lance-head" probably most appropriate, each having a well-defined point, sharpened edges, and straight, blunt base. They measure from five and a half to seven inches in length, from two and a half to three inches in width, and from one-third to three-fourths of an inch in thickness.

Some six or eight of the specimens have the maximum length and minimum width, and two or three are obtusely pointed at either end; otherwise, any one specimen is a fair representative of the whole number. The material from which these "lance-heads" were manufactured, is a dark yellow jasper, more or less veined, and occasionally enclosing a ribbon of shot-like, glassy particles. A mass of this mineral was found not far distant from the spot where the "lance-heads" were discovered, and from *it*, evidently, they had been made, as the characteristics of the specimens were well marked in the unused mass.

The collection, when discovered, was arranged in a series of circles, the specimens being placed upright on their bases; and each circle was closely fitted within the other. Two-thirds of the collection was so arranged, while the remaining third, lying on their sides, walled them around so closely, that had they been upon the surface, they would have maintained their position. No jasper is found in the locality, otherwise than as small, irregularly shaped fragments, and as small-arrow heads of various outlines.

The neighborhood of Trenton, or that portion of it extending from the southernmost limit of the city to Bordentown, bounded on the west by the river Delaware, and east by the Trenton and Crosswicks Turnpike, is here treated of. This includes a meadow, bluff and upland, six miles in length, by from two to four in width; and in any section whatsoever of the locality is to be found, more or less abundantly, Indian antiquities. These, for the most part, consist of arrow-heads of yellow, green, black and olive colored jasper, also of white quartz. These arrow-heads are of various shapes, and average an inch and a half in length. Stone axes of two patterns are abundant; one having a well defined edge and back, with a deeply worn notch on each side, for fastening a handle thereto; the other having an as equally well marked edge, but with the back tapering to a point. These latter are generally made of serpentine. Pipes of three varietes are occasionally found; one being a cylindrical bowl of two inches in length, with a pedestal, giving it the appearance of a wine-glass; another having a globular bowl, well hollowed

[Oct.

out, and a stem of an inch in length curving upward from the bottom, being similar in shape to most of the briar-root pipes of the present day; the third variety is a flattened tube of an inch and a half in width by three inches in length, with a bowl of an inch in diameter upon one end. Of this latter variety but two specimens have been found, so far as the author can ascertain. They were both well covered with deeply engraved designs, the principal one of which was evidently intended for the rising or setting sun. Fragments of pottery are also numerous, but not as promiscuously scattered in the locality as are the other articles mentioned. They are generally from two to four inches square, and always marked more or less with lines, dots, circles, &c., but never appear to have any particular design.

The bluff fronting the Delaware, and varying from thirty to seventy feet in height, contains, throughout the greater portion of its extent, human skeletons in a moderate state of preservation. They are all buried in a recumbent position, with their feet pointing to the east invariably. The majority of them are encased in clay coffins, which latter have so far proved too fragile to bear exhuming entire.

No skeletons have yet been discovered with these, that have been buried in a SITTING POSTURE, but below the southern limit of the locality treated of in this paper (Bordentown) *the skeletons exhumed are found in such a position.**

These clay coffins, as the fragments of pottery to be found, are always covered with fantastical markings, evidently intending to portray, in the coffins, however, some object or objects; but specimens have not yet been procured of sufficient size to determine the exact character of the figuring. This pottery is generally a third of an inch in thickness.

The following interesting account was communicated to me by Mr. T. A. Conrad of Trenton—member of the Academy:

"In 1829, while taking earth from the bluffy bank of Watson's creek, a small stream about a mile distant from the locale of the "lance-heads," a fire-place or oven was discovered. The spot was walled about with large stones, all well blackened by fire, and the enclosure was covered with well preserved wood ashes. Fragments of pottery were also scattered about the enclosure, and pieces of larger size were inside, indicating the breakage there of a vessel. The "fire-place" or oven was about seven feet below the top of the creek bank, about two feet above high-water mark, and three below the level of the surrounding meadow."

The meadow surrounding the place is usually inundated once yearly, but at present the deposition is not appreciable; although Mr. Conrad states that the whole meadows were formed by such depositions.

These are the points of interest connected with the locality, and with the discovery of the collection of "lance-heads," which latter appears to be an unique phase in the discovery of Indian antiquities in this neighborhood. Many vague rumors prevail in the locality of the discovery now and then, and formerly, of copper bracelets, strings of sea-shells on copper-wire, &c., but no such specimens have been seen, as yet, by the author.

Description of a New Species of PLEUROCERA.

BY GEORGE W. TRYON, JR.

PLEUROCERA PLICATUM, Tryon, t. 2, f. 6.

Description.—Shell ovate-conical, spire attenuate, the upper whorls closely plicate, the lower ones smooth or obsoletely concentrically striate. Whorls

* Catalogue of Crania in Acad. Nat. Sci., Philadelphia, by J. Aitken Meigs, M. D. Manta Indian crania.

but slightly convex, sutures well impressed. Color light green, with usually a lighter band below the sutures, and ornamented with narrow or broad brown bands. Aperture canaliculately produced ; outer lip thin ; columella twisted.

Dimensions. L. ·7, diam. ·35 inch.

Hab. Nashville, Tenn.

Remarks. I owe to Dr. Gould the opportunity of describing this beautiful little species. It differs from *P. grossum*, Anth., in being more slender, different in color, and in having bands. The aperture is not nearly so large, proportionally, and the plicæ are finer.

Description of a new species of TEREDO, from New Bedford, Mass.

BY GEORGE W. TRYON, JR.

Teredo Thomsonii, Tryon, t. 2, f. 3, 4, 5.

Description.—Valves convex, longer than wide; the body rather stout. Anterior auricle moderate, obliquely sub-triangular; the posterior auricle small, not very wide, short, somewhat reflected outwards. The dorsal margin does not rise above the beak, and the basal margin does not extend so far down the body, (which it joins almost at right angles,) as the anterior area.

The transverse sculpture of the anterior area is sharply sculptured, and becoming much more crowded towards its basal margin. The body, which is surmounted by a narrow beak, and terminates below rather obtusely, has the usual depressed narrow radiating area much more depressed than in the other species, only obsoletely sculptured, and defined anteriorly by a quite prominent rib.

The separation of the posterior auricle is determined by a rather strong sulcation. Internally, the shell is glossy and rather smooth; the posterior auricle overhangs, with a sharp, nearly straight projection. Immediately above this it is concave, then convex; and is marked by semicircular strong growth lines. Beak with an oblique tubercle. Body with a well developed depression corresponding to the radiating area outside. The usual internal rib is scarcely developed, but the posterior tubercle is very prominent. Apophysis thin, blade-shaped, a little wider at its termination, situated obliquely to the direction of the body, with one edge turned slightly towards it. Pallets obliquely, or sometimes regularly, obovate. The style is short and directed backwards. The margins of the blade are convex, sometimes regularly rounded, and sometimes heart-shaped at the end. From the style an elevated ridge extends around a portion of each side of the blade, and is smooth, while the centre, extending to the end, is lunately striate. The style extends in the form of a lamina through the centre of the other side of the blade. Tube not concamerated, rather thick, and frequently much twisted.

Hab.—Marine Railway and Cedar Buoys, Harbor of New Bedford, Mass.—J. H. Thomson.

Station.—Three or four feet below low water mark.

Observation.—This new species of Teredo differs from all the others in the very small proportionate size of the posterior auricle, and its not extending basally as low down as the anterior area, in the depressed obsoletely sculptured radiating area of the body, and the corresponding internal depression and in many other minor respects. The pallets are not unlike those of *T. dilatata*, Stimpson, but the shell differs very much.

I am much indebted to my valued correspondent, John H. Thomson, Esq., of New Bedford, for over a hundred specimens of this species, and take great pleasure in dedicating it to him as a slight recognition of the services which he has rendered to most of the Conchologists of the United States.

In a recent letter, referring to this species, he writes, "I am sorry to say

that their name is legion, even the Cedar buoys in the Harbor only last one season.

Teredo navalis, Linn. Accompanying the above were a few valves and tubes of this species.

Xylotrya fimbriata, Jeffreys. I also found among the New Bedford *Teredæ*, two pallets, apparently belonging to this species.

Xylotrya setacea, Tryon. Mr. Gabb writes to me that this Californian species, which I supposed was quite rare, when I described it, is committing great ravages in the harbor of San Francisco, and is unfortunately very numerous in individuals.

Descriptions of two new species of Mexican Land Shells.

BY GEORGE W. TRYON, JR.

HELIX RÉMONDI, Tryon, t. 2, f. 1.

Description.—Shell narrowly umbilicated, thin, turbinately globose. Epidermis very thin, light corneus, with a single narrow chestnut band encircling the periphery and visible just above the sutures of the spire. Substance of shell thin and appearing smooth to the naked eye, but under a lens minutely punctate. Whorls four, slightly convex, the last rounded, scarcely descending. Base of the shell convex, but with a narrow angle around the umbilicus. Aperture rotundately semi-lunar; lip slightly expanded and reflected; the margins not approaching on the columella, which is entirely free from callus.

Dimensions.—Diam. maj. 17. min, 15, alt. 12 mill.

Habitat.—Cinaloa, near Mazatlan. Auguste Rémond.

Observations.—This pretty species resembles, in some respects, *H. Trypanomphala* Pfr. from "Sierra Maestra, Mexico," but evidently differs somewhat in form, and particularly in that of the lip.

I name it after our Corresponding Member, M. Auguste Rémond, of the California Survey, who collected it and kindly sent it to me for description. The two specimens before me are almost precisely alike in form and size.

Helix ventrosula, Pfr. Near Mazatlan; M. Rémond. Not previously reported from the West Coast of Mexico.

Glandina turris, Pfr. Near Mazatlan, M. Rémond.

CYCLOTUS COOPERI, Tryon, t. 2, f. 2.

Description.— Shell widely umbilicate, globosely turbinate, rather thick, covered with a corneous epidermis, unmarked except by crowded and rather deeply cut growth lines. Spire conoidal, more or less depressed. Whorls 4½ to 5, convex. Lip simple, straight, acute; the junction of the margins scarcely angulated, and merely touching the body of the shell above. Aperture white and shining within. Operculum?

Dimensions.—Diam. maj. 16, min. 14, alt. 12 mill. Long. apert. 7 mill.

Habitat.—Cinaloa, near Mazatlan. Auguste Rémond.

Observations.—This species is not unlike *C. translucidum*, Sby., in form, but has a wider umbilicus, is much thicker in texture, and the growth lines are strongly impressed.

Named after Dr. J. G. Cooper, Zoologist of the California State Geological Survey.

Nov. 3d.

The President, Mr. LEA, in the Chair.

Twenty-four members present.

Dr. Leidy exhibited specimens of Nostoc pruneiforme, brought by Mr. Scattergood from a fresh-water lake, in Maine.

Mr. Abbott exhibited a number of jasper lance heads, similar to those recently described by him in a paper presented to the Academy. The additional specimens were obtained, together with a stone axe, from an Indian grave, in the vicinity of Trenton, N. J.

Mr. Abbott further remarked, that he had recently witnessed extraordinary numbers of Belone truncata in the Delaware and Raritan Canal. He also stated that he had noticed that the flesh of the Lepidosteus appeared to possess poisonous properties.

Nov. 10*th.*

The President, Mr. LEA, in the Chair.

Twenty-seven members present.

The following were presented for publication and referred to Committees:

"Notes on the Birds of Jamaica. By W. T. March, with remarks by S. F. Baird." Pt. ii.

"Addition to the Catalogue of Stars which have changed their colors." By Jacob Ennis.

"The Causes of the changes which have occurred among the Stars." By Jacob Ennis.

Nov. 17*th.*

The President, Mr. LEA, in the Chair.

Twenty-three members present.

The following were presented for publication and referred to Committees:

"Synopsis of the Species of Strepomatidæ. Pt. i." By Geo. W. Tryon, Jr.

"Notes on some species of Rapacious Birds," and "Notes on the Picidæ, continued." By John Cassin.

"Notes on the species of Sebastes," &c., "Description of the genus Oxyjulis," "Description of the genus Stereolepis," and "Note on some recent additions to the Ichthyological Fauna of Massachusetts." By Theo. Gill.

Dr. Leconte called attention to specimens of fresh-water shrimps, from the Mississippi, opposite Vicksburg, presented by him this evening.

The Committee on Proceedings, laid on the table the published number for August and September.

Nov. 24*th.*

The President, MR. LEA, in the Chair.

Twenty-four members present.

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

(Communicated by the Smithsonian Institution.)

Notes on the BIRDS of Jamaica.

BY W. T. MARCH.

With remarks,

BY S. F. BAIRD.

(Continued from page 154.)

II.

CUCULIDÆ.

85. SAUROTHERA VETULA.—We have met with several nests of the Old Man Bird in this district in the season of 1862, but all with young birds. According to a note I made of a nest taken in 1848, "The old man bird builds a loose nest of sticks in low bushes, though sometimes more elevated, and lays 3—4 eggs, light green, clouded partially with a thinly dispersed chalky substance, measuring 1 $\frac{7}{16}$ by a little more than 1 inch," and I find the accuracy of this note confirmed by eggs collected this season, 1863.

86. PIAYA PLUVIALIS.—The nest of the Rainbird is sometimes found in the lowlands, but more frequently in the hills, it is a rough deep cup made of dried sticks loosely put together, and lined with leaves, &c., and generally contains 3—4 white eggs, oval or oblong oval rounded at both ends, variable in size, measuring 1$\frac{3}{8}$ to 1$\frac{1}{2}$ by 1$\frac{1}{4}$.

Mr. Gosse's informant must have been mistaken in the eggs he described as belonging to *Saurothera*.

PSITTACIDÆ.

I have had no opportunity of seeing a perfect specimen of any of the Macaws said to have been found on the Island. On one of my professional visits to Montego Bay, in 1834, I saw in the possession of a settler from the Mountains of St. James, near Accompong, the head, wings, and tail of a Macaw, which he said he had shot near Maroon Town. I did not at the time take sufficient interest in this branch of Natural History to note the particulars, but I have a perfect recollection that the head and neck were a bright green with red in the forehead and chin, the tail blue and red, and the wing blue and green. About two years after, Mr. Richard Elmas Breary, then residing in the Mountains of St. James, assured me that he had on one occasion, whilst traversing the Mountain road from St. James to St. Elizabeth, seen three blue and yellow Macaws flying high overhead from one ridge to another. Whether the Macaws be permanent residents, or only occasional visitors, I have not heard of any being seen since 1849. Sir Hans Sloane, in his History of Jamaica, published in 1725, mentioned a blue and yellow parrot. The next notice of the Macaw as found in the Island is by Patrick Brown. In his History of Jamaica, page 472, he states that he has seen one or two in the woods of St. Ann's, and he calls them the blue Macaw of Edwards, evidently the same species as that mentioned by Sloane; they both refer to a 2d species as introduced. The next is recorded by Robinson, (1765,) and was said to have been shot by Mr. Odell, ten miles east of Lucea, in Hanover; this is supposed by Mr. Gosse to be either *A. tricolor*, or an undescribed species. Mr. Hill speaks of others found in the Mountain district, between St. Ann's and Trelawny, which answer the description of *A. militaris;* and the Rev. Mr. Coward's birds seen in flight in 1842, in St. Elizabeth, were blue and yellow. All the species of the smaller Psittacidæ of the Island breed in decayed hollows in the trunks of old trees, generally high up, laying three or four eggs on a slight bedding of trash feathers, and debris of rotten wood; several pairs of the yellow bill have been known to build in one cavity when the space was sufficiently commo-

dious ; they sometimes make their nests in those tangled masses of trailing plants found enveloping the lofty trees in the dense highland forests. I, once in the parish of St. John, saw a nest of the black bill taken from such a mass of *Bignonia echinata*, which had formed a natural bridge over a chasm between two precipitous rocks. The perroquets sometimes select the abandoned nests of the Duck and *Termites*. This appears, however, to be an exception to the general habit, and only when the nest embraces the trunk or a large branch of the tree. I have unfortunately mislaid my notes of the eggs of the Parrots and Woodpeckers, and have had no opportunity of procuring any for several years. During the breeding season, from March until August, the Parrots mostly retire to the deep woods on the highest mountain ridges, occasionally, however, returning to the lower ranges of hills and valleys, when, tempted by the berries or fruit of some forest tree, then in bearing, or by young maize or ripe bananas on the grounds, or corn fields of the mountain settler; but in these raids they never remain very long at one time, sometimes descending in the morning and returning to the higher hills in the evening, at other times remaining for a few days only.

The small species are

82. Chrysotis collaria, L. (*Psittacus leucocephalus*, Gosse.)—The yellow-billed parrot is more generally distributed in lower ranges than the others ; the iris is usually hazel, but in some is greyish yellow. I have often met with mature individuals of this species in summer livery, spotted all over, the upper plumage with blue and yellow spangles. We have a caged bird which puts on this change every summer.

81. Chrysotis agilis. (*Psittacus agilis*, Gosse.)—I have never seen more than a few stragglers of this species in the lower hills. It appears to be almost restricted to the higher ranges.

197. Conurus nanus. (*C. flaviventer*, Gosse.)—From specimens I have at different times collected, these appear to be distinct species.

PICIDÆ.

83. Picus varius.—I have never met this species of Woodpecker, unless one I saw in possession of Mr. Hill, a few years back, belonged to it. Mr. Hill obtained in from Manchester. It was grayish white marked with reddish brown spots.

82. Centurus radiolatus, Wagler.—This is a very common species, found at all times in every part of the Island, from the sea coast to the highest mountain ridges.

TROCHILIDÆ.

23. Lampornis mango, L.—The "Doctor bird" is very common in the lowlands, as well as in the mountains. Their breeding season seems to extend from February to July ; the nest is a neat cup, generally with a flat bottom worked on the branch, but it is sometimes in a fork with a conical bottom, varying in size, the largest about 2 inches across, and a little more than 1 inch in depth on the outside, and $\frac{3}{4}$ of an inch within. In the lowlands it is constructed of down of *Eriodendron* and some species of *Asclepias;* in the mountains, of these and of *Ochroma lagopus* and *Tillandsia*. It is always stuccoed on the outside with a whitish lichen. The eggs are oblong, rounded at both ends, pure white, and measure 11-16ths by 7-16ths. The nest is easily detected, as the bird always hovers round the intruder on his approaching it, as if inclined to attack him.

24. Aithurus polytmus. (*Trochilus polytmus*, Gosse.)—This species is not uncommon in the lowlands from April till September, but is met with on the hills at all times. It is found abundant in the vicinity of the groves of

Jambosa vulgaris, (Rose Apple). The wall of the nest is rather thicker than that of the preceding, and is generally made altogether of down, covered, some thickly, others sparely, on the outside with spider's webs, lichen or moss; the eggs are pellucid white, and like the thin-shelled eggs of small birds, have a tawny stripe before they are blown; they are oblong, rounded at both ends, and measure 9-16ths by 6-16ths. The long feathers of the tail vary from 8 to 11 inches.

191. Aithurus fuliginosus, Hill.*—I have met with this second species of long-tailed Humming bird only in St. Ann's. The male is smoky-black, with the long tail feathers, the female brown, and without the tail feathers. I have mislaid my note of the dimensions, but the male is smaller than the *A. polytmus*.

25. Mellisuga humilis.†—The length of this bird varies from $2\frac{1}{4}$ to $2\frac{1}{2}$ inches. It appears to breed at all seasons, as I have found nests in every month of the year. The nest is made sometimes wholly of down, at other times thinly covered on the outside with lichen, moss, or spider's webs; it is generally about an inch high and the same in diameter; the cup barely $\frac{1}{2}$ an inch within, some being much smaller; the eggs are oblong, rounded at both ends, pellucid white, tawny before they are blown, and measure 15-32ds by 11-32ds.

79. Mellisuga minima.—This diminutive species of Honey Sucker, though not uncommon in the mountains, is rarely met with in the lowlands. About the Penns in the neighborhood of the Moneague they are abundant, building generally in the low shrubs about Walton and other pastures in the Moneague district. The nest is built of down and spider's webs, and the largest I have met with was only $\frac{3}{4}$ of an inch in height, and less than $\frac{1}{2}$ an inch in depth within the cup. The eggs are pellucid white, oblong, rounded at both ends, and are only 5-16ths by 3-16ths. The dimensions of this diminutive bird are, length $1\ \frac{5}{16}$, expanse $2\ \frac{5}{16}$, flexure $\frac{15}{16}$.

78. There is another species of small humming bird, rather larger than *M. humilis*, with the plumage of a bright metallic or bronzed green. The nest and eggs are a little larger than those of *M. humilis*.

192. Trochilus maria, Hill.‡—I have never met with this species, which is very rare, only three specimens having been recorded, according to my information.

I have been told of another distinct humming bird found on the Dry Harbor Mountains, but have never seen it.

CAPRIMULGIDÆ.

10. Chordeiles popetue.§—The large night or Mosquito Hawk retains here all the habits, attributed to it on the Continent. This species I have only met with from April to October, but the *Chordeiles minor* is a permanent resident, as I have obtained specimens in nearly every month during the year. They are rather a twilight than a night bird, lying during the day on the ground or ledges of rocks, or on lateral branches of trees; taking wing only in heavy cloudy weather, or immediately after rain, in the dusk of the evening, at early dawn, or on bright moonlight nights. The eggs are deposited on any slight elevation, in the open pasture or savanna, free from any shade; they are often found on a spot where bush has been burnt off, and in the moun-

* I do not know where this species is described; it may be the *T. stellatus* of Gosse, referred to by Mr. Gould, (B.)

† Mr. Gould considers this as identical with *M. minima*, (B.)

‡ This species is considered by Mr. Gould to be identical with *Aithurus polytmus*.

§ This species is not distinguished from the next by Gosse. (B.)

tains on the ledges of rocks. The male does not appear to take any part in the work of incubation, as I have never seen more than one bird near a nesting place, and I am sure I have seen the nuptial contact performed on the wing. Two eggs are generally laid, yet seldom more than one is found at any spot. If the nest be disturbed, the bird will remove the egg in its mouth to another spot at a distance; this I have seen done several times on the Salina, at Great Salt Pond. The eggs are oblong oval, resembling dark colored pebbles, varying in size. I have noted several varying from $1\frac{1}{4}$ by $\frac{7}{8}$, to $1\ \frac{7}{16}$ by one inch; they are grey stone color, dashed all over with Vandyke brown and grey slaty marbling, but they differ a great deal in the shades of color.

214. Chordeiles minor. (*C. virginianus*, Gosse.)—Wherever the *C. popetue* is found, there the small Piramidig will be seen in company. Their habits and nidification are alike, the only differences I have observed being in the size of the bird, the length of the wing, and the eggs; these latter vary in form and coloring as much as those of the large night hawk; they measure 1 3-16ths by a trifle over $\frac{7}{8}$ of an inch, some rather more or less; they are sometimes grayish or bluish white, clouded all over or on the smaller half only with bistre-brown and slaty marbling. The egg mentioned by Mr. Gosse, (p. 40), probably belonged to this species. The dimensions of the bird are, length 8—$8\frac{1}{2}$ inches; expanse 19—$19\frac{1}{2}$ inches; flexure $6\frac{1}{2}$ inches.

190. Siphonornis americanus, Sclater. (Proc. Zool. Soc., 1861, 77.)—The first I saw of this bird was a specimen from near Linstead, St. Thomas in the vale. It was one of a pair that were lying lengthwise on a lateral branch of a dead tree, crouched closely to the branch. One was shot, and the other flew into a thick foliaged Mango tree close by, where it concealed itself so effectually that it could not be detected though a strict search was made for it. I am informed they are often met with in the Saint Catharine Hills.

11. Nyctibius jamaicensis.—The common Potoo is widely distributed throughout the Island, in the plains as well as in the highlands. It is said to lay on the ground two eggs, larger, but very like those of the *Chordeiles*. I have never met with either nest or eggs.

12. Nyctibius pallidus.—The white-headed Potoo is a mountain bird, and more rare than the preceding.

189. Nyctibius .—The tawny brown Potoo is of frequent occurrence in the cool glades and gullies of the lower hills; it is rather smaller than the common Potoo ————, possibly immature individuals of that species. The plumage is grayish white marked with reddish brown. I have never seen it far from the foot of the hills. It is sometimes found on the banks of the Rio Cobre, above Spanish Town.

The two American Antrostomi are said to be found in the Island, but I have never seen or heard a specimen of either.

CYPSELIDÆ.

13. Chætura collaris. (*Acanthylis collaris*, Gosse.)—This species is abundant in some parts of the island, but they are seldom seen, except in overcast, cloudy weather, or immediately before or after rain, towards evening; when they leave their cavernous retreats, in the rocky ranges of hills in which they are domiciled, to feed on the insects brought out by the damp atmosphere. The localities in which I have often seen these martins are in the neighborhood of the Ferry and Healthshire in St. Catharine, and on the line between St. Ann's and St. Mary's and St. Thomas' in the Vale, and there they are seen, on a fine evening after the rain, with some other species of Hirundines, skimming over the adjacent plains and fields, attracted by the myriads of insects; they are either wholly or in part resident during the entire year, and

breed in the fissures of the rocks, in places in which, though I have often seen them enter, I was unable to follow from their narrowness. The eggs are pure white.

14. Tachornis phœnicobia.—We have here, with the Palm Swift, an instance of a total change from natural habits induced by adventitious circumstances. Previous to 1854, the habitat of the Palm Swift was altogether confined to the palm-trees, in this district (St. Catharine), and to the cocoanut palms near the coast at Wreck Bay, Healthshire, Port Henderson and Dawkins Pen, at Passage Fort. In that year a colony of them established themselves on two cocoanut palms in Spanish Town, one near the centre of the town, the other at the northeast corner, and there they remained until, in 1857, the palm at the northeast was taken down and the other divested of the lower fronds, and the Swifts turned adrift. They were then for the first time observed flitting about the lower piazzas of the House of Assembly, the upper part of this building having been previously occupied by the *H. fulva*. In a short time these prior occupants were driven out, and a considerable colony of Palm Swifts now occupy the lower colonade in front of the ground-story used as public offices, where they build on the tops of the end walls, or at the angles formed by the beams and joists. None resort to the upper piazza; but they pertinaciously drive away the *H. fulva* on every attempt they make to effect a lodgment. Small colonies of the Palm Swifts last year (1862) again returned to the palm in the centre of the town, but the large colony still retained its position in the buildings. The nests are here built in clusters, without the elaboration found on those in the palm spathes. Each nest contains two or three long-oval, pellucid white eggs 10-16ths to 12-16ths by 7-16ths. Before the eggs are blown, the yolk gives them a pale amber tint. Two small colonies of the *H. fulva* have this year (1863) effected a lodgment in the upper piazza of the buildings, but they have an unquiet time of it,—the Palm Swifts keeping up a continuous warfare with them.

15. Cypselus niger.—This, like the preceding species, is rarely seen, except in early dawn, or in dull, cloudy weather, or after rain in the afternoon. I have sometimes procured specimens from Healthshire and the St. Catharine Hills. The only place of their actual resort I know, is a cave on the lower St. Catharine's Hills, near the Ferry, where they dwell in the narrow, deep galleries and fissures of the limestone rocks.

TYRANNIDÆ.

48. Tyrannus griseus. (*T. Dominicensis*, Gosse.)—The number of Petcharies departing from, or remaining in, the island seems to depend in a great measure on the supply of insect-food consequent on a dry or wet summer. There is some confusion in Mr. Gosse's first quotation from Mr. Hill's notes,—the emigration of the Petchary occurring in October, and the immigration in early spring. The word migratory in the first paragraph of the quotation evidently refers to those birds forming the band of migrants preparing to depart from, and not to their actual departure from or return to, the island. The facts as I have observed them are, that during the last few days in August or the first in September, the Petcharies quit their usual haunts and resort to the pastures, savannahs and adjacent hills and valleys along the coast, both on the north and south sides of the island. During the day they keep to the woodlands, but an hour or two before sunset they congregate on the tall trees around the ponds about the pastures and savannahs, and in the vicinity of river-courses and mangrove swamps, wherever their insect-food is most abundant, to take their evening meal before roosting for the night; and there, perched several in rows on the most elevated, dry branches, they dart about uttering their peculiar cry and capturing insects, always returning to their perch to devour their prey. In a few days they become exceedingly fat,

and are then shot in great numbers for the table. Early in October, generally within the first three or four days, they depart, taking a southwesterly direction, leaving, however, many of their numbers, no doubt composed of the permanent residents or the late nestlings; and many more, meeting with a plentiful supply of their favorite food in some localities, are tempted to remain. Soon after the departure of the migratory flocks, those remaining resume their accustomed haunts, both in the highlands and lowlands, where, in solitary pairs, they occupy, as their particular domain, some lofty tree, in the possession of which they remain till the following August, permitting no intruder to interfere with their occupation. The cocoanut palm is often selected by them from its being usually the most lofty. The migrants, on their return in the spring, usually the end of March, or early in April, (the period varying in different localities,) gradually disperse, and, like the resident birds, occupy their selected tree in solitary pairs. They immediately commence the work of nidification. In St. Catharine's, the first nest I have found was on the 14th of April, and the latest about the same date in July. They seldom build in their perch tree, selecting generally some lower tree near to it; some make their nests high, others low, usually at the extremity of a lateral branch of the cashaws, (*Prosopis juliflora* and *Acacia tortuosa*;) the nest is a rather loose structure of twigs and stems of trailing plants, with the cnp of fibre, grass, or horse-hair, frequently of all intermixed. They lay three, rarely four, long oval eggs, measuring from $1\frac{1}{8}$ by $\frac{3}{4}$ or 13-16ths of an inch, clayish white, or light cream-color, dashed principally round the large end, some thickly, others more sparingly, with blotches and spots of burnt sienna, and slaty or pale bistre cloudings beneath.

49. Tyrannus caudifasciatus.—The Loggerhead is found, though not so abundant as the Petchary, in all parts of the island; when the latter congregate in September, previous to their leaving the island, they are joined by this species; these, however, are permanent residents, and do not emigrate. The Loggerhead is never willingly shot by the sportsman, as it seldom puts on even a slight degree of fat, though it is sometimes mistaken for its congener and thus falls a victim by its unfortunate association. Their habits are in most respects those of the Petchary; the nest is of the same size, formed of similar materials, and built in similar situations; it usually lays three, rarely four, oval eggs, light drab or dark cream-color, dashed as those of the Petchary, with burnt ochre and slaty markings, and are more uniformly 1 by $\frac{3}{4}$ of an inch.

I have specimens without the occipital crest.

50. Myiarchus validus, Cab. (*Tyrannus crinitus*, Gosse.)—The Red Petchary of the South and the Red Loggerhead of the mountains and Western districts agrees with the common Loggerhead in its general habits, except that of association; it is always found solitary, or in pairs; in its nidification it is totally different; the nest, like that of the other *Myiarchi* and smaller fly-catchers, is a slight matting of twigs and leaves, lined with cow's or goat's hair, placed in a fork or indentation or decayed hollow near the top of a tree, wherever a convenient lodgment for the materials is found, and sometimes on the decaying summit of the tree; never in a deep hollow. It lays three or four, sometimes five, longish oval eggs, 1 $\frac{3}{16}$ by $\frac{7}{8}$ of an inch, clayish white, splashed with spots and scratches, and about the large end with blotches of Vandyke-brown, and pale sepia, and slaty spots.

47. Myiarchus stolidus.—Of the three species of fly-catchers known here as Tom Fools*—for I believe the three to be distinct—the black-cap Tom Fool

* Mr. March has transmitted specimens of all his three supposed species of smaller Jamaican *Myiarchi*; but I am not at present prepared to pass judgment upon their claims to distinctive rank.—S. F. B.

appears to answer the description of Gosse's Foolish Petchary: his dimensions are, "length 7½ inches, expanse 10½, flexure 3¼, tail 3, leg nearly 1, bill (not given by Gosse) ¾ by 5-16ths at the base." His description, "Iris hazel, bill black, feet blackish grey, upper parts bistre brown, darker on the head, paler on the back, basal part of the outer edge of the primaries narrowly chestnut, greater and mid coverts, secondaries and tertiaries edged and tipped whitish. Tail even, feathers broadly edged inwardly with chestnut. Cheeks grey, mottled; chin, throat and forebreast greyish white; breast, belly, vent, under tail coverts, and interior of wing pale yellow. Head feathers erectile. The female has the primaries and tail feathers edged with whitish instead of chestnut," (this is not constant.) This and the next species, if they be really distinct, build in hollow stumps, bamboos, and decayed hollows of low trees, a matting of leaves and down intermixed with soft hair: and sometimes pieces of snake's and lizard's skins are found in the nest of this as well as of the other smaller species of fly-catchers; they all seem to have a predilection for the hollow, decayed stumps of the upright *Cerei*. The nest of this is often found in a penguin plant; the eggs are usually three, oval or longish oval, cream or yellowish drab, splashed with umber and slaty spots. They measure 15-16ths by 11-16ths of an inch.

215. Myiarchus ———— .—The common Tom Fool is like the preceding in general habits, but differs otherwise in many respects. The bill is ⅞ by nearly ½ an inch wide at the base; the length the same. The wings a little longer. The entire upper plumage bistre brown; the markings of the wing coverts imperfectly defined and rusty white; the feathers of the head close and compact, and not darker than the rest of the upper plumage. The chin, throat, head and sides dappled grey, lighter on the breast, rest of the under plumage and under wing coverts yellowish. This species often builds in the thatch or shingles under the eaves of houses and house gutters. I have one nest found in the shell of an old gourd, which had fallen into a forked branch of the tree, and remained there until the pulp decayed. The coloring of the eggs is lighter than that of the preceding.

Myiarchus ———— .—The greater Tom Fool approaches the Red Petchary (*M. validus*) in general habits and nidification, but the plumage is that of the black cap. The bill is much stouter than either of the preceding; the four covering feathers of the tail edged with white at the tips; the length over eight inches. It will sit perched for hours on a dry branch of some tall tree, from which it now and then makes a short flight after some passing insect, uttering a harsh, shrill note or cry, (somewhat like pip-pir-e-pir-ee,) captures its prey and immediately returns to its perch. It builds, like the *M. validus*, a slight matting in the hollow at the top of a decaying tree or tall stump. The eggs are four, longish oval, about 1 by ¾ of an inch, pale green, splashed with burnt sienna and slaty spots, partially confluent at the large end.

212. Myiarchus ————*.—This is the second specimen (both females) I have met with of this "curiously-feathered bird." This one was obtained, with the eggs, at Two-mile Wood Savannah, near Spanish Town. It appears to be an individual of the last species in adventitious plumage. The nest, a slight matting, was taken from the hollow top of a decaying tree. The eggs four, oval, pale green, splashed with burnt umber and slaty spots, partially confluent on the large end, measured 1 by 11-16ths of an inch. The three species or varieties known as our Tom Fools are subject to albinism.

194. Elænia cotta.—This species of fly-catcher was at one time supposed to be confined to the southwest parishes, but I have, within the last five or six years, found it abundant about the south mid-land districts during the

* Probably a partial albino of *M. stolidus* (B.)

winter months. It does not, however, seem to breed there. During the breeding season, from April till September, it appears to retire to the hills. I have several nests and eggs sent to me as identified with the species, but I cannot rely on the authority. Some were evidently eggs of *Blacicus* and *Contopus*. The nests were the same. I last year obtained from St. John's a nest and three eggs, which one of my sons, on whose information I can generally rely, assured me belonged to this species. The nest is constructed of similar materials to that of the Tom Kelly, but rather smaller and not pendant; the eggs dull white, splashed all over with burnt umber dots, confluent about the large end, and measure 6-8ths by $\frac{5}{8}$ of an inch.

I have not yet met with *Elænia fallax*. May it not be the immature state of the preceding? In the yearling birds of both the Petchary and Loggerhead the concealed crest is, for the first six months, entirely absent, then rudimentary white and gradually assumes the yellow or red color pertinent to the species.

46. Blacicus tristis. (*Myiobius tristis*, Gosse.)—Both the flat bills are generally found sitting in solitary sadness on low branches of trees and shrubs in the mountain waysides; but this species rarely in the lowlands. The nest is, like that of the *Myiarchi*, a matting of grass, bark and hair placed in hollow stumps or bamboos. The eggs are oval, usually three, measuring 13-16ths by 11-16ths of an inch; creamy or clayish white, splashed all over with burnt umber and pale bistre spots and scratches.

45. Contopus pallidus. (*Myiobius pallidus*, Gosse.)—This, like the preceding species, is found most abundant in the hills. It is, however, of more frequent occurrence in the lowlands. The eggs and nidification are the same. The coloring of the eggs lighter and the spots rather larger.

COTINGIDÆ.

51. Hadrostomus niger, (*Tityra leuconotus*, Gosse.)—The large mass sent in the first collection of nests is constructed by the Black Shrike; the nest is built generally in the centre, but sometimes at the bottom or on one side; the nest itself is small; other small birds often occupy portions of the structure. The mass, when taken, measured three feet long, by two feet across, and about twelve inches thick, and was suspended from a lateral branch of a lofty Santa Maria tree. There were three small nests on it; the first at one side of the middle, apparently the nest of the preceding year; the two others were near the bottom; the concealed nests had three rotten eggs of the Shrike, the other had two fresh eggs like those of *Glossiptila*. The eggs of the Shrike are usually three, oval, dull white, thickly splashed all over with pale bistre or slaty spots, principally about the large end, and measure one and one eighth to one and three-eighths by thirteen-sixteenths. The structure is sometimes an irregular roundish mass with a profusion of materials hanging loosely about it—like that sent in the second cluster of nests. The Grass Finches, Cotton Tree Sparrow, Soursop bird, and other small birds often build their nests in the mass formed by the Shrike.

TURDIDÆ.

30. Mimus orpheus, Linn. (*M. polyglottus*, Gosse.)—The tropic Nightingale or Mocking bird is very social in its habits, and is found in every part of the Island. The nest is usually built in low trees or shrubs, often close to a dwelling or frequented path; it is a loose structure of twigs, generally thorny, with a shallow cup about two inches deep and four inches across, made of grass fibre, hair, wool, cotton, shreds of cloth, and many other kinds of material, the lining being generally hair or fibre. The eggs are oval or long oval, some more pointed than others, olive green splashed all over, but more thickly at the larger end, with umber dashes and splashes intermixed

with pale brown spots; they vary in size as well as form, one and three-sixteenths, by thirteen-sixteenths or fourteen-sixteenths, to one inch by six-eighths. The Mocking bird, when taken young, is easily domesticated, but does not live many years in confinement. If a nest of young birds be taken and placed in a cage near the nestling place, or within a mile of it, the parent birds will find them out and tend and feed them until they are able to care for themselves, but if they are not then removed, and the parents still have access to them, they will, on finding the young unable to escape, poison them, using the berries of a *Cestrum* or *Solanum* for the purpose. This I have often tested. This year I took a nest of young birds, and captured the female at the same time; at first the male brought them for food berries of *Malpighia Guiacum*, and *Hamelia* and insects, and after a few days, finding his mate still in confinement, brought the berries of *Cestrum vespertinum*. The young ones died first, and during the next day the female also died; several of the berries were found in the cage. This may almost appear a fiction, but it is here an established fact to many persons. When young and in the nest, large maggots are generally found under the skin of the shoulders and head.

The Mocking birds are very bold, and will fearlessly attack any one interfering with their nest, as exemplified by a curious fact which recently occurred. A pair has been for several years accustomed to build in an *Auruaria*, growing in the public square, but this year (1862,) early in the season, a pair of Loggerheads, *Tyrannus caudifasciatus*, appropriated the same tree to themselves, and commenced constructing their nest. The Mocking birds were seen constantly in the square, but never interrupted or interfered with them until they had nearly completed the nest; they then drove away the Loggerheads, took possession of it, adding a few sticks to the outwork, laid the eggs and hatched the young brood. The poor Loggerheads hovered about the place in great distress for a few days, but never attempted to regain possession of their property. The Grakle is the most determined enemy the Mocking bird has, destroying their eggs and young without mercy; when the attack is made by a single pair of Grakles, the Nightingales keep them off with ease, but the marauders sometimes come in a body, and whilst the Mocking birds are engaged in driving away the first comers, the others fall on the nest, and seizing the young or eggs in their claws, fly away with their prey before the return of the Mocking birds.

29. Mimus Hillii, March.* (*M. orpheus* of Hill.)—The Spanish Nightingale, or Mocking bird, has many habits of the Thrush. It is, I believe, the bird referred to by Mr. Gosse as *Turdus mustelinus*. The dimensions are, length 11; expanse 13½; flexure 4½; tail 5½. The nest is of similar materials and construction, and rather larger than that of the preceding species; the eggs are more uniform, the ground color a kind of drab green, thickly splashed all over with small spots of pale madder. This species was formerly thought to be entirely restricted to a short distance, not more than three miles, from the sea beach, from Vere to St. David; they are now found to be spreading more inland into Clarendon. It is abundant about Passage Fort, Port Henderson, Green Bay, and Great Salt Pond. I have never met with it on the north side. I am informed, but I have had no opportunity of testing the information, that it is to be found about the hills of Rio Bueno, Dry Harbor and Oche Rios; it is, I dare say, in a more extended range than has come under my observation. At Great Salt Pond and Port Henderson I have often heard it display its remarkable faculty of imitating the notes of other birds, and even the yelping of the puppy, and the mewing of the kitten. I saw, a few years ago in Kingston, in the possession of the late Dr. McGrath, a lively individual of this species, which was perfect in its powers of mimicry. It was fed

* This species is very closely related to, if not the same with *M. bahamensis*, Bryant, and it is quite possible that both may be identical with the *M. gundlachi*, Cab., from Cuba, although the description of the Cuban bird is insufficient to decide the question. S. F. Baird.

principally on fruits and soaked biscuit. I have never observed in this species the maggots found on the young of the *M. orpheus*.

27. TURDUS AURANTIUS, Gm. (*Merula leucogenys*, Gosse.)—The Hopping Dick is widely dispersed throughout the mountains as well as the lower limestone hills, and sometimes even to the lowlands; but never goes far from the foot of these hills. The nest is sometimes found in tall trees, but more frequently in low shrubs and bushes; it is a rough mass, composed of roots, twigs, fibre, grass, leaves, stems of trailers, and pieces of trash with a cup formed of the softer materials in the centre, and the bottom of the mass generally cemented with mud. The eggs are oval, sometimes pointed at one end, glaucous white or pale raw sienna, splashed all over with small irregular splashes, and spots of burnt sienna, partially confluent; they measure one and three-eighths by fifteen-sixteenths of an inch; the typical eggs have no slaty marking. Individuals of this species are often found in gray mottled plumage.

28. TURDUS JAMAICENSIS, Gm.—The Glass Eye is a highland bird, and though often induced to descend to the lower hills in search of food, I have never met with it in the lowlands. The nest is smaller and more compact than that of its congener, and made of similar materials. The eggs are long oval, tapering to one end, glaucous white, dashed all over with dashes and spots of burnt ochre, with slaty or pale bistre spots beneath, confluent at the large end; measuring one and seven-sixteenths by about one inch. Both the Thrushes are sweet songsters, with full clear and mellow notes; those of the Glass Eye are more varied. The Hopping Dick eats insects, but the principal food of both is berries and fruit. They are both easily kept in cages and soon become docile and entertaining in confinement.

SYLVICOLIDÆ.

38. DENDROICA PETECHIA, L. (*Sylvicola aestiva*, Gosse.)—This species is a contant resident and known here as the Mangrove Canary, and is rarely seen far from the sea. The nest is often met with in the mangrove swamps along the coast, built in a fork or two more approximate upright branches, often in a lateral fork; it is a neat cup about three inches across, and as much in depth on the outside and two inches deep within; the bottom is conical, except when built on a large branch, then it is flat; some are constructed of grass, roots, fibre, leaves, feathers and debris of sea weeds; in others, down forms a considerable portion of the outer fabric, but the lining is generally of grass or fibre, sometimes of feathers; the eggs are three or four, oval, clayish white, splashed all over with umber brown, and pale slaty spots, principally around the large end, and measure three-fourths by half an inch.

Stragglers of migratory warblers often remain here during the summer, but this is not constant either as to species or numbers, guided possibly by the anticipation of an inclement or genial summer on the Continent. In 1862 we observed numbers of most of the species throughout the whole year. In 1863 the only species we have met with (exclusive of No. 38 and 202) are a limited number of *D. coronata* and *D. discolor* near Spanish Town and *D. tigrina* at Healthshire. I think, as a general rule, the migratory Sylvicolidæ only arrive in the early part of September; those observed earlier are such as have remained during the summer and their young of the year.

36. DENDROICA CORONATA.—During the second week in May, 1862, I was informed by one of my sons, that several pairs of Yellow Creepers were building in the large trees of Inga Saman, at the riverside near Spanish Town, but the May rains set in and prevented any further investigation at the time, and when he returned to the place after the rains had ceased, the nests were destroyed.

I have this year, 1863, secured one of the birds, which I send, (No. 258.)

[Nov.

37. Dendroica superciliosa, (*Sylvicola pensilis*, Gosse.)—I have not myself met with this species during the summer months, but on the 8th of August, 1862, an old bird, accompanied by two young ones, made their appearance in my garden in Spanish Town; the young birds were evidently too young and weak to have crossed the Sea; by the 11th of August they became abundant. On mentioning to one of my sons the early appearance of these birds, he told me he had seen them all through the summer flitting about the Cashaw trees in the vicinity of the Town, and called my attention to a specimen he procured at Great Salt Pond on the 4th of June, 1862.

26. Mniotilta varia.—I am sure I have often seen this species in the mountains during the summer months; but I have no note of it. I am informed by a gentleman residing on the line of Saint Ann and Saint Mary, that they were abundant in that district during the summer of 1862, but he did not find any nests. One of my sons saw a pair at Great Salt Pond in June, carrying materials into a Mangrove clump; he could not, however, detect the nest; neither of them could mistake the bird, as I had several specimens which were recognized by both—unless they were *Dendroica pharetra*, a species I have never met with.

31. Geothlypis trichas. (*Trichas marilandica*, Gosse.)—Stragglers of this species are sometimes met with during the summer. In the early part of May, 1861, I was informed that a pair were building in a garden near Linstead, St. Thomas in the Vale, but the nest was removed by some intruder before it was completed. The birds after a few days disappeared. On the 10th of May, 1862, a fine specimen of this bird, sent in third collection, was obtained at the same place.

40. Dendroica discolor. (*Sylvicola discolor*, Gosse.)—This species is found in numbers during the entire year, but not so abundant in the summer months. They are generally seen on the Cashaw trees and low bushes, widely distributed about the cattle pens. I find them always busy about the *Malpighia glabra* in my garden, no doubt capturing small insects from the ripe fruit. My children tell me they have seen it often take up a fallen cherry and fly away with it, I dare say on account of the small flies usually infesting this fruit.

32. Vermivora pennsylvanica.
35. Parula americana.
41. Dendroica canadensis.

These are regular annual winter visitors, coming generally in considerable numbers in autumn, and spreading widely, the two first in mountains and plains; the last in the highlands.

32. Dendroica tigrina. (*Certhiola maritima*, Gosse.)—This species is always found, in its various changes of plumage, about the Mangrove swamps and river banks. During the summer months it is common about Healthshire and Great Salt Pond, at other times generally distributed. Specimens of the nest and eggs have been sent to the Smithsonian Institution.

44. Setophaga ruticilla.—I have often, in my summer excursions, seen specimens of this species in the mountains, particularly of Port Royal, and I have been informed they are sometimes seen in St. George and Metcalfe during the summer. On the 16th of August, 1862, three of this species, one mature female and two young birds, came into my garden in Spanish Town; one of the young birds was only able to fly short distances, from tree to tree, and the old bird had to return several times to induce it to follow; they appeared the day after a heavy scud of rain from the hills on the north. There are now several flitting about the *Capparis* and *Eleretia* trees, capturing a small moth which at this time infests the latter tree. Like the Fly-catchers, it always takes its prey on the wing, and when it finds an insect quiescent drives it off before seizing it.

Dendroica eoa, D. pharetra and D. palmarum, I have never met with.

33. Seiurus aurocapillus. 34. Seiurus noveboracensis.—These two species are regular annual visitors. On the 5th of August, 1862, I found a pair of the last named species at the river side, near Spanish Town, but they generally arrive at the end of that month or in the beginning of September and depart in the early part of April.

Mr. Hill has the drawing of a third species with the plumage of the *S. aurocapillus*, but without the fulvous crown.

42. ————————.—This is another of Mr. Hill's beautiful drawings, a pair of Creepers, with a nest, taken near Spanish Town. The nest is a dome, like those of the *Certhiola flaveola* that are elaborately covered with down. I have never met with this species.

VIREONIDÆ.

53. Vireo altiloquus. (*Vireosylva olivacea*, Gosse.)—From early in March till, October, the Tom Kelly abounds, but is rare during the winter months. Nests are found from April till August. It is a neat cup suspended between two twigs or a fork, 3 inches across, and rather more than 2 deep on the outside and 1½ within; constructed of grass intermixed with down, webs, tendrils, fibre, grass and leaves, but always lined with grass or fibre, generally that of the root of the trailing *Cereus*. The eggs are two or three, oval, pointed, some rather elongated, measuring $\frac{7}{8}$ by $\frac{5}{8}$ of an inch; porphyry-white with a few reddish dots and points sparely scattered about it, some have large dots about the larger end. Their song is of these notes: "tchew-tchew it," several times repeated; this is its matin hymn, at other times varied with "tchew-it-tchew-ee-tchew-ee-tchew-it."

52. Vireo modestus. (*Vireo noveboracensis*, Gosse.)—This, though a permanent resident, is not so common as the Tom Kelly. The nest is very frail and slightly made, suspended from a fork or two near twigs, composed of horse hair, fibre, fine grass, and the flower stalks of grass, the wall so thin that the eggs are easily seen through it. These are generally two, rarely three in number; porphyry-white, splashed with fine reddish dots and points and measure 13-16ths by 9-16ths of an inch. The note of this species is at times a wailing cry, resembling somewhat the mewing of a cat.

193. We have another *Vireo* very similar to this, but with its irides reddish.

Mr. Hill has recognized the *Vireo gilvus* on the railway line between Spanish Town and Kingston.

AMPELIDÆ.

54. Ampelis cedrorum. (*A. carolinensis*, Gosse.)—The Cedar bird is not a constant visitor, several years intervening between the periods of their advent; they, however, when they do come, generally appear in considerable numbers, remaining only for a few days. I have only met with them twice, but I have no note of the dates.

55. Myiadestes armillatus. (*Ptiliogonys*, Gosse.)—The Solitaire is entirely restricted to the dense highland woods; it is at times very common about the woods, above New Castle, in Port Royal Mountains, and along the ridges between that parish and St. George's, as well as about Abbey Green, one of the approaches to the Blue Mountains. I have never seen the nest or eggs. A Maroon, from Moore Town, once told me he had met with a nest, and that it is like a small calabash, made of stems of bind weed, (trailing plants), and thatch fibre and trash, and that the eggs were greenish with brown spots.

[Nov

HIRUNDINIDÆ.

16. HIRUNDO FULVA. (*H. pœciloma*, Gosse.)—These swallows are found in all the caves in the limestone ranges, generally domiciled with large colonies of bats; formerly they occupied parts of all the public buildings and many delapidated houses about Spanish Town. The *Progne* has, however, driven them from the Secretary's office, and another building now occupied by the Executive Committee, and lately the Palm Swifts have forced them to abandon the House of Assembly; from the other public buildings they are also excluded by the vigilance of the keepers, though they often attempt a lodgment. They are now congregated in large colonies at the railway stations. Small parties or solitary pairs still, however, hover about their old haunts in the town, during the breeding season. One pair built on the Bishop's Registrar's Office, and although the office was closed from 3 o'clock on Saturday until 7 o'clock on Monday morning, they built their nest and laid three eggs, which I took from them before they left. They have often attempted to return every season to the House of Assembly, and commence building, but their little neighbors, the Palm Swifts, allow them no rest until they have driven them away. This year, 1863, a few pairs have succeeded in making a lodgment. The nest is a half of an oblong mass of mud and grass well worked together, with a flat top or platform, and a small cup filled with down. The flat side of the section is stuck against the wall or beam; the eggs are three, varying considerably in form, size, and markings, the type, $\frac{7}{8}$ by 9-16ths, long oval, white, splashed with dots of burnt ochre, thicker at the larger end. In some the marking is almost obsolete.

HIRUNDO EUCHRYSEA.—I have not yet had an opportunity of noting this species, I have only met with two indifferent specimens; they are, I am informed, to be found at Content, in Manchester, where they form a colony in an old building also occupied by the *H. fulva*.

18. PROGNE DOMINICENSIS.—Though sometimes met with domiciled in buildings, the *Progne* still manifests its peculiar predilection for dark places. In the office of the Island Secretary, in Spanish Town, they resort to the ceiled roofs of the upper story, entering through holes found under the eaves, where they live and carry on the work of incubation in total darkness. At each end of the House of Assembly is a hole drilled through the brick wall for the insertion of a pipe for carrying off the surplus water from the drip and water jars; in consequence of some alterations made in this respect, the pipes were removed and the holes stopped up from within, but left open outwardly; in each of these holes the *Progne* builds every year. In the mountains, caves and hollow trees are chosen for the nestling places. The nest is composed of an odd mixture of shreds of cloth, silk, paper, leaves, grass, twigs, &c., all loosely put together with a lining of down and feathers. In Spanish Town the nest is composed principally of the soft, flexible portion of the seed pods of the *Catalpa longissima*. The eggs are round, oval, clear white, 15-16ths by 11-16ths of an inch. The species is musical. It is one of the phases of the Naturalist's barometer, as whenever, though the atmosphere be clear and dry, the *Progne* perches on the weathercock or lightning rod, on the highest points of the house top, or on the topmost twigs of some lofty tree, chaunting his incantation, cloudy weather and rain will surely follow within 24 hours. I believe stragglers of this species remain during the winter months. Several species of the migratory *Hirundines* traverse the Island from north to south in the autumn, and from south to north in the spring. They pass in considerable numbers high overhead. Sometimes, in squally weather, their flight is lower, skimming rapidly along, rarely alighting, and then only for a few seconds. I have on several occasions had passing glimpses of some alighting for a moment at some water puddle in the road or street, but these opportunities are rare. On one occasion I saw distinctly some large Martins with

ashy-blue backs, and others were black swallows. I observed and heard several flocks pass over in September of 1862, but they were too high to recognize.

43. Cotyle riparia.—The Bank Swift has been obtained from St. Elizabeth, and figured by Mr. Hill.

CŒREBIDÆ.

21. Certhiola flaveola.—The Banana Quit builds a domed nest in low trees or shrubs, seldom more than five or six feet from the ground, often selecting a branch close to a door or window, or frequented path, and their nests with eggs or young are found at all seasons. In the country they are composed of soft grass and down interwoven ; some are elaborately covered on the outside with down ; in the towns and near homesteads, the exterior is often studded with scraps of rags and cotton ; one taken from the low branches of an *Erythroxylon* is ornamented on the outside with the dry flowering stems of a scandent *Boerhaevia ;* the interior of each is, however, lined with grass and fibre only. They lay three, rarely four eggs, variable in size and coloring ; the dimensions are from 7-16ths by 5-16ths, to 11-16ths by 9-16ths of an inch ; the ground color varies from pure white to neutral tint, whilst others are reddish ; they are splashed with various shades of brown or reddish-brown spots, often confluent in a circle or a ring round the larger end, with pale slaty spots beneath. This species, as well as the several grass Finches seem to have a predilection for nestling on the same bushes with the common wasp, and the nests are more often found in the different species of *Cereus* and other thorny plants.

65. Glossiptila ruficollis. (*Tanagrella* —— of Gosse.)—The Orange Quit is altogether a mountain bird. It builds a deep, coarsely formed cup of grass and fibre intermixed, sometimes with the stems of small ferns and wiry moss. The eggs are 4 ; 11-16ths by 9-16ths of an inch, white, speckled with dull-reddish spots, inclined to be confluent at the large end. I have this year, 1863, obtained eggs of this species, identified with the bird, particularly one nest taken from a mass constructed by the black Shrike, and these answer to the description in my note, and show that the eggs in the first collection do not belong to the species.

TANAGRIDÆ.

63. Spindalis nigricephala. (*Tanagra zena*, Gosse.)—I have never, myself, taken the eggs of the Orange Bird or Mountain Goldfinch, but have had nests and eggs often brought to me as belonging to the species. They are very like those of the Banana bird ; the nest is rather thicker and more coarsely constructed, usually with the fibre from palms and tree ferns, and generally contain 3 eggs. These are long oval, tapering at one end, and measuring $1\frac{1}{8}$ by $\frac{3}{4}$ or 13-16ths of an inch, greyish stone, marbled with irregular lines of sepia, and clouded with pale slaty blotches round the large end.

64. Pyranga rubra, is rarely met with in cool mountain glades ; and appears to be only an occasional visitor.

66. Euphonia jamaica. The nest of the Blue Quit is a dome, composed of grass and down intermixed, thickened and covered on the outside with down or moss, according to the locality in which it is built. It contains 4 oval eggs, 13-16ths by 9-16ths of an inch, clear white, splashed all over with dashes of reddish-brown, more or less confluent, at the larger end. The nests of this species are always scarce in the low lands. The down used is generally that of *Asclepias*, sometimes of *Eriodendron* or *Ochroma*.

I have been informed that there is a blue and white Creeper, common in

the Port Royal Hills, but I have not seen it; possibly *Dendroica pharetra* or *Mniotilta varia*.

FRINGILLIDÆ.

71. Phonipara Marchii, Baird.* (*Spermophila bicolor*, Gosse.)—The 'black faced' is the most common of the Grass Finches. They are social, and, like the *Certhiola*, are found nesting at all seasons in low trees and bushes, and in the same situation. I have never met with the nests of the other three species of Grass Finches, except during the Spring and Summer months. The nests are domed, generally composed of grass and fibre, and lined with the same materials, sometimes with horse hair. Near homesteads, shreds and scraps of cloth and lumps of cotton, feathers, and trash, are added to the exterior. The eggs are usually 3, sometimes 4, rarely 5 or 6, and vary in dimensions and coloring as much as those of the *Certhiola*; some are rather larger and others sometimes elongated to a tapering point at one end.

72. Phonipara adoxa. (*Spermophila*, of Gosse.)—I have never met with the nest of this species near a domicil. In the country they build higher, and the nest, a dome, is smaller than that of the last species, and always made of grass and fibre; never with the other materials found on the nests of the black face. They are lined with fibre or horse hair; the eggs do not vary in size and color so much as those of the last species, and are rather larger; the markings are of burnt ochre, confluent about the large end, and they measure often $\frac{3}{4}$ by 9-16ths of an inch.

70. Phonipara olivacea. (*Spermophila* of Gosse.)—The yellow-faced grass Finch, constructs a domed nest of grass and fibre, always with a soft lining of down at the bottom. The eggs, 3 or 4 in number, are more uniform than those of the two preceding species. They are usually oval or oblong-oval, pointed at one end, and are white, splashed with grey-brown or light umber mixed with pale slaty, sometimes reddish-brown spots, confluent round the larger end or middle. They measure $\frac{3}{4}$ by 9-16ths of an inch.

69. Loxigilla anoxantha, Sclater. (*Spermophila* of Gosse.)—The yellow-back is the largest of the birds known here as grass Finches, or Quits. The nest is a dome, and is composed of grass fibre and down, intermixed and interwoven. The opening is oblong nearly the entire depth, leaving a very shallow bottom, in which 3 or 4 eggs are deposited. All the eggs I have found identified with this species are oval, pointed at one end or oblong oval, white, splashed with reddish-brown spots, (sometimes very pale,) confluent in a circle or a ring round the large end; sometimes round the small end or middle. The markings are sometimes a dull brown. This Finch has a curious fancy for continually, during incubation, adding materials to the exterior of the nest. I have found fresh grass thus added after the young have been hatched.

73. Loxigilla violacea. (*Pyrrhula violacea*, Gosse.)—The Cotton-tree Sparrow, though a mountain bird, often breeds in the lowlands. It generally selects, though it does not confine itself to, a decayed hollow in a tree; the crutch of two or more upright branches, or a clump of *Tillandsia* or *Cuscuta*, or some trailing plant equally answers its purpose. The nest is coarsely made of grass, trash, twigs, stems of trailing plants and leaves, with a small cup of fibre and grass, closely interwoven, and contains 4 eggs. These are oval,

* This is the *Spermophila bicolor*, of Gosse, but not the true *Fringilla bicolor* of Linnaeus which is the Bahaman species, differing in the much greater extent of black beneath. It may be the *Tiaris omissa* of Jardine described from Tobago; but this author expressly states that his bird is distinct from the Jamaican. If, as I think most probable, the Jamaican species is thus without a name, to no one could it with more propriety be dedicated than to Mr. March, who has done so much towards extending our knowledge of the natural history of his island.—*S. F. Baird.*

rather elongated at one end, measuring 1 by $\frac{3}{4}$ of an inch; bluish or greyish-white, splashed with dashes and spots of umber mixed with pale brown, sometimes confluent into a blotch on and round the large end.

67. Coturniculus passerinus. (*C. tixicrus*, Gosse.)—The grass pink is not an uncommon bird in the savannas and grass lands near Spanish Town. The nest is a small, rudely made cup, fixed very low, sometimes on the ground, in tufts of grass roots. The eggs are 4, oval-pointed at one end, and rather large for the size of the bird, measuring 13-16ths by 10-16ths of an inch, bluish-white, splashed sparsely with spots and irregular dashes of burnt sienna intermixed with pale-brown spots on the large end. The song of the grass pink is, chi-chi-cree, several times softly and rapidly repeated. The cry of tichichro-cro-cro, attributed to it, is no doubt the call of the *Ortygometra jamaicensis*, which, after the breeding season, resorts to the same coverts as the grass pinks.

68. Crithagra braziliensis.—I have had no opportunity of noting the nidification of the "Canary." I am, however, informed that the nest and eggs are like those of the Goldfinch of Europe. The *Crithagra* was, until the last 3 or 4 years, almost confined to the neighborhood of Hodge's Pen, in St. Elizabeth, to which it was first introduced; but it is gradually extending its range, and is now found at Long Hill, in the same parish, 30 miles from Hodge's Pen.

ICTERIDÆ.

58. Quiscalus crassirostris.—The Grakles select the tallest trees, clothed with the most dense foliage, in the neighborhood of their intended location, whether it be the lofty bamboo, genip-hog plum or black cherry, or the more lowly mango, lignum vitæ, or capparis, and occupy it in companies of 6 or more, often as many as 20 pairs, allowing no other bird to encroach upon their chosen domain. Each pair, however, builds a separate nest, which is about 8 inches across, coarsely constructed outwardly with the stems of trailing plants, (in this district generally that of *Cassus Cissioides*,) with a compact cup of 4 inches diameter and 3 inches depth, of dry stems of convolvuli and other trailing plants, fibres and fibrous roots, on a bed of decaying leaves. The eggs are 3—4, variable in form and size, round, oval or elongated, measuring from $1\frac{1}{8}$ to $1\frac{3}{8}$ by $\frac{7}{8}$ of an inch. They are of a dull metallic green, (rapidly discoloring when blown,) marbled with irregular sinuated lines and scratches, with a few blotches and splashes of dark sepia, intermixed with pale slaty spots; sometimes the lines and spots are nearly black. On all the breeding trees in the neighborhood of Spanish town, and there are many, the nests remain undisturbed from year to year, the birds at other times roosting elsewhere in large flocks, and only resorting to these trees in the breeding season; at this time they are usually so silent and cautious, that a person may pass and repass the trees many times before detecting the nests. The usual food of the Grakle is insects, worms, lizards, and the eggs and young of other birds; the larger prey he clutches with one foot and flies with it to his nestling or some tree near by, and standing on one leg, presses his prize with the other on the branch, and tears it to pieces, feeding his young with or devouring the portions, as he tears them away. The attack on the nests of the larger birds, is often made by parties, and so fiercely, that the nests are torn and the materials scattered away. I lately saw a young Grakle with a small, brown tree lizard in his beak, and presently the parent bird brought another which he also took, but for a long time he kept running, in great tribulation, backwards and forwards with the two dead lizards in his beak, not knowing what to do with them, until after the lapse of more than an hour the old bird returned and assisted in tearing them to pieces.

When I first saw a Grakle rubbing himself with an over-ripe lime, I was

certainly at a loss to account for the object of the operation, until afterwards, in preparing some specimens, I discovered that he is much infested with bird-lice; his object, evidently, was to rid himself of this nuisance, A roasted lime is used in rubbing domestic poultry for the same purpose. The Grakle is very destructive to the crops of oranges, by puncturing with and inserting the beak in the ripening fruit once or twice, and the fruit so punctured, soon after falls.

There is to be found in St. Ann and St. Mary a small Grakle with the habits of the preceding.

59. Icterus leucopteryx. There is a variety of the Banana bird, known as the yellow tail, in contradistinction to the common kind or black tail,* a little duller in plumage, the yellow tail and dark ground color of the eggs constituting the only differences I can find to distinguish them. The latter, or black tail, is found abundant everywhere, the former only in certain localities, but when they meet they appear quite familiar, and the two often mate, and I have sometimes found one or two black feathers in the yellow tail. There is no difference in the materials or construction of the nests, both building with similar materials, black or white horse hair or fibre, or both intermixed; the fibres generally used are those of the roots of the trailing Cerei or the fibre of different species of *Cereis*. The nest is a small sack or purse 3 or 4 inches across and about the same depth, depending from a fork, or two approximate branches, and usually contains 3 or 4, rarely 5 oval or long oval eggs. These are more or less tapering at one end and variable in size; of those taken from one nest, one measures 1 inch by 6-8ths and another $\frac{7}{8}$ by $\frac{5}{8}$ of an inch; those of the black tail are creamy or clayish-white, and those of the yellow tail dark cream color or light drab, both marbled at the large end with irregular spots and lines of dark sepia or umber-brown, and cloudings of pale burnt umber and bluish-grey; sometimes a few spots and dashes are sparely scattered below.

62. Dolychonyx oryzivorus.—The Butter bird is an annual visitor. They come in large flocks and are very regular in their arrival in October, then being in winter plumage. After a few days resting in the commons and Guinea Grass fields, then in seed, they proceed on their southward route. They appear again in Spring on their return northward, but in smaller flocks, and the male is then in Summer plumage. The Butter bird is often caged as a song bird, but never survives the second winter of confinement.

Nesopsar nigerrimus. (Sclater, Ibis, 1859, 456.)—The Black Banana bird, is not, I am informed, uncommon in the highlands, but I have never, to my recollection, met with a specimen of it. Some years back a black bird sporting in a tree near New Castle, in the Port Royal Mountains, was shown to me as this species, but I had no gun. The nest is described as of a structure like that of the *Icterus* but smaller, and the eggs also smaller with similar markings.

60. ————————. I have often met in St. Ann with another small black bird, known there as the black sparrow; it is apparently Icterine. I obtained, many years ago, some specimens of this, but they were destroyed by *Dermestes*. It may be the Black Banana bird.

CORVIDÆ.

Cyanocorax pileatus. I have never heard of any other individual of this species found here, except the one mentioned by Mr. Gosse, and that was probably a caged bird escaped from confinement.

* These appear to be merely different ages of the same species, requiring two years to attain the mature male plumage, as in the case of *Icterus spurius*. (S. F. B.)

54. Corvus jamaicensis.—Mr. Gosse has given a very full and graphic history of this bird. They build in company like rooks, on the loftiest forest trees, and are then very fierce. I have for several years endeavored to induce the settlers in the vicinity of their breeding trees to procure me eggs of this species, but they have always declined, fearing an encounter with the parent birds.

COLUMBIDÆ.

98. Geotrygon montana.—The Mountain Partridge is one of our ground pigeons, breeding and roosting, however, on trees. Its food is the same as that of the White Belly, and like that bird always feeds on the ground. In the autumn and winter months it feeds in company, and is then met with in the plains near the foot of the lower ranges of hills. It generally builds on low trees or bushes, but the nest is occasionally found near the summit of tall trees. I have never heard of its nest being found on the ground. The eggs are two, oval or round oval, rarely pointed at one end, measuring 13--16ths to $1\frac{1}{8}$ by $\frac{7}{8}$ of an inch, and vary from reddish drab to cream color. The dark colored bird is the female, the rufous the male.

97. Geotrygon cristata. (*G. sylvatica*, Gosse.)—The Mountain Witch is often found abundant in the St John's and St. Catharine's Hills. I have not been able to discover the great affinity to the true Gallinæ, said to exist in the Mountain Witch, except in the formation of its legs, which are adapted to rapid motion on the ground; the wings are not proportionately shorter than those of the other ground pigeons; the thigh is clothed to the knee. It is not gregarious, though, like many others of the tribe, several are usually found feeding in the same locality. It lives principally and feeds on the ground, running with great quickness when disturbed. It roosts in low trees and shrubs, and breeds on the ground or in low bushes four or five feet high. I have never found more than two eggs or young in any nest; the eggs are roundish oval, stone color, measuring $1\frac{5}{8}$ by a little more than an inch. The squabs are like the rest of *Columbidæ*, at first very helpless and sparely covered with soft downy hair, and are fed in the nest by the old birds until they are able to follow them. The Mountain Witch never takes to a tree unless suddenly alarmed. The female takes the largest share of incubation, the male usually perching on some low bush near the nestling place, until required to take his turn; he remains until the return of the female from feeding. Its food is the same as that of the White Belly. It is very tame and docile in confinement, but is never sufficiently domesticated to be left at liberty. It is said to feed on the white or duck ant. I do not know this as a fact, nor have I met with any one who does; it is, however, possible, as the egg of the Termiles is firm and resembles a semi-transparent berry.

Mr. Gosse mentions the finding of small snails in the gizzard of the *Geotrygon;* this may be accounted for by the fact that, in the early morning, at certain seasons, myriads of small-shelled snails are found crawling among the decaying leaves and vegetable debris, in all the damp mountain glades and hillsides. Many of these may be thus picked up with the seeds on which these doves feed.

77. ———.—The Blue Dove is another ground pigeon, with the form of the Pea Dove, and the habits of the White Belly. The body is blue, the neck and head grey. It builds in low shrubs, generally in clumps of *Tillandsia*, or on the ground; the egg is the form and size of that of the White Belly, and is a light brownish drab.

There is a bar-tailed pigeon found sometimes in the highlands, on the line of St. Ann's and Trelawny, the size of the Bald Pate, but without the white poll. It is ashy blue above, the tail has a broad discolored white band; it is

known as the Ring-tail. It is probably only an occasional visitor, though it is sometimes seen in numbers. It may be *Columba fasciata.*

90. Columba carribea.—The Ring-tail is strictly an arboreal pigeon. It is supposed to drink from the water collected in the wild pines, the large growing species of *Tillandsia*, *Bilbergia*, and others. I have, however, been informed by Maroons from Scott's Hall and Moore Town, that they have often waited in ambush for these birds, as they came in the afternoon to drink at the mountain springs. This pigeon usually keeps to the deep woods of the highest ranges of hills, where, perched amid the dense foliage of some lofty tree, it remains securely screened from observation. In the autumn and winter months it sometimes descends to the lower ranges of limestone hills, but never to the low lands or plains, in quest of food. It is rarely seen in parties of more than six or eight, and then only whilst feeding on the fruit and berries of the several species of *Ficus*, *Laurus*, *Bumelia*, *Puniata*, *Eugenia*, and other fleshy and succulent fruit and berry-bearing forest trees. Grain does not appear to form an article of its food in a state of nature, as it is with difficulty led to feed on corn in captivity, and is consequently difficult to cage. In the breeding season, during the spring and summer months, the Ring-tail retires altogether to the dense woods on the high mountain ranges, inaccessable to all but the Maroon or hardy mountain hunter. Many sportsmen inexperienced in this kind of woodcraft, have lost their lives in attempting ring-tail shooting, without a competent guide, by falling over precipices or into sink-holes. The nest, a thick mat or platform of sticks bedded with leaves, twigs, and soft bark, is constructed near the summit of some lofty tree enveloped in tangled masses of trailing plants; the eggs are ivory white, but I have no note of the measurement.

91. Columba inornata. (*C. rufina*, Gosse.)—The Blue Pigeon is also an arboreal and highland Pigeon, sometimes, however, and particularly during the Guinea corn season, it descends to the plains. Its food is fruits and berries with the addition of grain. In January and February, in the early morning, it is seen in small companies of six or eight or as single pairs, passing from the hills to the fields of ripening Guinea corn, and again returning in the evening to the hills. It is more wary than the Ringtail. The nest is also a platform, but more massive than that of any other native pigeon; it is more easily detected than that of the Ringtail, as it is often placed on some lofty tree in the vicinity of clearings, and in the open glades and hillsides. The egg is ivory-white, and larger than that of the Bald-pate.

92. Columba leucocephala.—There are two varieties of the Bald-pate pigeon, distinguished as the Mountain and Mangrove Bald-pate; the iris is hazel, with dark chestnut pupil. I have not met with the latter in the mountains, but both kinds resort at all times to the lowlands and mangrove swamps along the coast, and to the neighboring islands and keys (Pigeon and the two Goat Islands in particular) where they breed in numbers, making their nests in trees, some at high elevations, others so low as to be within reach of a person standing, according to the convenience of the site. Large numbers of squabs are often taken from these places and brought into the towns for sale. They feed in company in the morning and afternoon, and as they often feed at a distance from their roosting places, large flocks are sometimes seen in the early morning and evening passing and repassing overhead, sometimes in high, at other times in low flight, going to and returning from the feeding ground, or convenient watering place. Their food is grain, fruit and berries, nuts and seeds, and they commit serious depredations on the Guinea corn fields, not only by the quantity they devour, but by breaking down the brittle corn stalks with the weight of their bodies. They are easily kept, and often breed in confinement, when they become quiet and contented, but take the earliest opportunity of emancipation. The nest is a platform of sticks

and twigs loosely put together, and bedded with softer materials, with a slight hollow in the centre; the eggs are two, glarish white, varying in form and dimensions, but usually long oval, $1\frac{5}{8}$ by $1\frac{1}{8}$ of an inch.

93. MELOPELIA LEUCOPTERA.—The White Wing is more a lowland than a mountain dove. They are gregarious, usually keeping in flocks of ten to twenty, but in January and February, in the Guinea corn season and other times, when the *Cerei* are in fruit, they congregate in large flocks, often of several hundreds. Their food is principally grain and seed, but they are equally fond of the ripe fruit of the different species of *Cereus*, abounding on the savannahs and salinas during the summer. Inland, the White Wing, like the Bald-pate, breeds in solitary pairs; but in the mangrove swamps and islands along the coast they breed in company, many in the same tree. The nest is a frail platform of sticks with a slight hollow of leaves and bark, sometimes a few feathers; the eggs are two, oblong oval, glarish white, 1 5-16ths by 15-16ths. The White Wing is kept and often breeds in confinement; it is at first wild, fluttering in alarm at the approach of any person, but afterwards becomes docile if attended with care. It crosses with the *Turtur risorius*. I have now a male White Wing mated with a female Ring-dove.

239. TURTUR RISORIUS.—The Turtle or Ring Dove is an introduced caged species, but I add it to the Jamaica birds, as I have sometimes seen parties of six or eight feeding in company with the White Wing in the Guinea corn fields and salinas; but I have never met with a nest in the woods. There is a variety pure white, without the ring, though bred in captivity for many generations, and though so docile in disposition, this dove cannot be allowed at large, as it generally takes advantage of any opportunity of escaping. It breeds several times during the year. The eggs are similar to those of the White Wing, and measure from one and an eighth by seven-eighths to one and three-eighths by an inch.

95. CHAMÆPELIA PASSERINA.—The Ground Dove sometimes perches and always roosts on low trees; but is otherwise generally found in pairs feeding on small grain and seeds. Several pairs may be seen feeding together, but they do not associate. It is very tame and is commonly found about homesteads and in streets and roads. It breeds in low trees. The cashew and logwood appear to be preferred. It is rarely seen in cages, as the note is a plaintive, mournful coo, and a Creole superstition attaches misfortune to the person keeping them. The nest is slightly made of twigs and grass in a fork or hollow. The eggs are two, round oval, white, seven-eighths by eleven-sixteenths of an inch.

94. ZENAIDA AMABILIS.—The Pea Dove is not gregarious, and although terrestrial, is often seen and heard on trees, and there it also roosts. It builds indiscriminately, in trees or on the ground, a slight platform of sticks and twigs loosely put together. The eggs are two, oval or roundish oval white, measure $1\ \frac{3}{16}$ to $1\ \frac{5}{16}$ by 1 inch. It is a favorite cage bird, and though apparently very timid and restless, may become very tame and docile, and take grain from the hand or lips of its feeder.

96. LEPTOPTILA JAMAICENSIS. (*Peristera* of Gosse.)—The White Belly is strictly a ground dove, never resorting to trees except to roost or for temporary shelter, when disturbed or alarmed, and then it always perches low. It prefers, but is not confined to the low ranges of limestone hills, particularly in those districts where the orange abounds, the pips or seeds of this fruit contributing largely to its support. Its food is also grain, seeds and berries; and though several pairs may be seen feeding under the same tree, they never associate. The White Belly breeds in low bushes, often in clumps of *Tillandsia*.

[Nov.

I have never seen the nest on the ground. The eggs dull white, generally round oval, measuring $1\frac{3}{16}$ by one inch.

There is another rare species closely allied to this dove, known here as the Spanish Pea dove, (not the *Starnoenas*.) Some years back I obtained one of a pair shot at Gregory Park, near the railway station, half way between Spanish Town and Kingston, but it was unfortunately destroyed by rats whilst in preparation. It had the appearance of a cross between the Pea Dove and White Belly.

GALLINACEA.

235. Numida mitrata?—The wild Guinea bird appears distinct from the tame one. It is in length twenty inches; expanse thirty; flexure nine. The eye is black, the beak and feet smoky black or dark brown, sometimes red above the knee; the plumage dark indigo, spangled white. They lay in tall grass or shrubby thickets; each individual lays thirteen or more eggs. Many pairs, however, usually breed together, possibly the old birds and nestlings of the previous year. In 1838 I found at the foot of a large cashaw tree, in a wide belt of Penguins, a nest containing more than one hundred eggs, and in 1843 another in a Guinea grass piece, with forty eggs, and as many more shells, from which the chicks had emerged, lying about the nest; I removed the eggs of the last nest and placed them under hens in the poultry yard. Many of them were hatched in batches of three or four at intervals of several days. When we first approached both nests, several old birds ran from the place and flew away; the eggs in both instances were deposited in layers with dry leaves and twigs intermixed, and I am told by many of the cattlemen, accustomed to range the woods and pastures in getting up cattle, that they have always found the nests with a large number of eggs in each nest, the Guinea birds always breeding in company and sitting together, and that, as a number of chicks are hatched and are able to quit, one of the hens leads them off to feed, the others remaining on the nest; and so in succession until the clutching be completed; each successive hen joining the first, and returning at night until the whole are hatched, and the young are strong enough to take a wide range. This species is very difficult to domesticate, for, though clutched under a fowl, they will almost as soon as they are hatched, quit the nest and take to the grass and bushes, unless kept in a close place; and even after they are full grown, will join the wild flock at the earliest opportunity. The domestic bird is often found in company with the wild flocks, and I have frequently shot a cross between the two. The eggs are generally one and eleven-sixteenths by one and seven-sixteenths, and are much darker than those of the domestic bird, usually a dark reddish drab. with, however, the same indented points.

100. Numida meleagris.—The domestic Guinea Fowl is much varied in plumage; some are nearly black with little of the spotted plumage, some are dark blue, whilst others are of various shades, from ashy blue to pearly white. It breeds from March to December, and lays at each clutch from fifteen to twenty eggs or more. A single bird has been known to lay more than sixty eggs in a season, when the eggs have been from time to time removed without permitting the bird to sit. The eggs are round oval, abruptly pointed at one end, and generally measure two by one and five-eighths of an inch; they are from clayish white to dark reddish drab, thickly speckled all over with indented points of a darker hue.

101. Ortyx virginianus.—The Quail abounds in all parts of the Island. They lay on the ground, generally in tufts of grass roots, or in penguin fences, or under heaps of bushes, with only the materials of grass or leaves found on the spot for a nest. This contains usually from twelve to twenty eggs, which are oval pointed, measuring one and one-fourth by one inch. During the period

of incubation the male is continually found sitting on a low branch in the vicinity of the nest, but does not appear to take any part in the process of incubation. The Quail cannot be kept in cages for any time, as from its impatient habit of running to and fro before the bars or wires, it soon becomes totally blind. I have, however, kept them for several years in a room or large aviary closed for about three feet at the bottom, where they have laid, but never hatched.

In 1826, or about that time, the late Mr. Laing turned out at Keith Hall, in the St. Catharine Hills, several of the French or Red Legged Partridges; none, however, have been since met with.

APPENDIX.

249. Falco anatum.—Several individuals of a Falcon have appeared about Salt Ponds this winter, 1862—1863, and also in the parish of St. Elizabeth, I have in my possession a living specimen taken at Goshen, near Port Henderson, in this parish, (not St. Ann's). It swooped on a large Cochin-China hen in a cottage yard on that property, and got entangled with the hen, which was too heavy for the hawk to lift, and in the struggle it was captured by the owner of the fowl. It appears to be a male; the dimensions are, length 16½ inches, expanse 40, flexure 13½; iris dark-hazel with black pupil, core yellow. The bill is small and weak, and leaden-blue, with a broad stripe of yellow covering the nostrils, frontal band narrow, white; head sepia brown spotted with black; a patch of black on the cheek extending over the eye, the rest of the cheek and throat white with a few black dots; breast white, clouded with reddish blotches; upper plumage reddish and slaty brown, each feather with greyish or rusty white edges; the entire under plumage white, with transverse and diagonal bands of slaty-black; legs and feet slender and yellow, claws black. Inner webs of wing quills barred with white; tail feathers barred with ashy and tipped with white; third wing quill longest.*

Notes on the MIMIDÆ of Jamaica.

BY RICHARD HILL.

(Communicated by the Smithsonian Institution.)

Mimus orpheus.—Linnæus, when he described in the list of his Thrushes the *Turdus polyglottus*, and the *Turdus orpheus*, and referred to Sloane's Jamaica for one, under the name of the Mocking Bird, and to Brown's Jamaica for the other, with no distinctive name, was noting the two remarkable *Mimidæ* of our late naturalists,—birds very different in song and very different in plumage, and yet commonly spoken of as very indistinctly distinguishable by those who, satisfied by "the bird in the bush," have never troubled themselves to examine "the bird in the hand,"—Linnæus, with his peculiar descriptive brevity, marks their character.

Turdus polyglottus. 7. T. obscure cinereus, subtus pallide cinereus, macula alarum albida. Eximia voce cantillat et cantu instruitur.

Turdus orpheus. 8. T. dorso fusco, pectore rectricibusque lateralibus albidis, alis fascia alba. Cauda longa rotundata. Rectrices extimæ albæ. E terra elevatus cantilena spectatorem rapit in sui admirationem.

I feel quite satisfied, therefore, that the common mocking bird of Jamaica should be called *Mimus polyglottus*, and not *orpheus*, as given by Sclater and others, and that the name of *M. orpheus* belongs to the larger darker species

* This specimen has lately been sent by Mr. March to the Smithsonian Institution. Though of smaller size than usual in the United States, it appears to be the same with our Duck Hawk, *F. anatum*, although the dark-cheek stripe is rather more distinctly defined than usual. (S. F. Baird).

referred to by Gosse as *Turdus mustelinus*, and which Mr. March, in his notes, has been so kind as to call *Mimus Hillii*.*

It was not until I came to the south side of Jamaica, after years of experience in the north, that I heard the *orpheus* sing, and saw the bird. It was said to be known only in a peculiar line of hills bordering the sea, and extending from the Milk river in Vere to the Healthshire hills at Port Henderson, opposite Port Royal. It is commonly enough known in this line of country, but its clear-toned *cantalena*, as Linnæus expresses it, may be heard from the topmost bough of copses and thickets away from the sea side, but not far into the plains. The bird will then be seen perched on the highest stem, pouring out in vehement extacy its oft repeated brilliant notes, not unlike those of the Song-thrush of Europe, (*T. musicus*), or perhaps more like those of the Storm-thrush, (*T. viscivorus*), for the song has much repetition and little variety, and sounds like the words *viechoo, viechoo, a vicho a-vicho vicho*, with some graduated tones of the same few notes, piped out clear, and for a long continuance. The rhapsody is sure to arrest attention, for it will not be two or three singing together usually, but one bird alone, and all the other songsters will be silent and turned to admiring listeners.

We understand things best by comparison. The Storm-thrush, known also as the Missel-thrush and the Holm-thrush in England, is the bird our *orpheus* most resembles in habit as in song. The fondness of the Missel-thrush for the outskirts of woods, and the habit of never entering pastures or open lands, unless they be dotted with copses, or wooded clumps, where it will be heard singing its high-toned song on the upper twig of the inmost tree is exactly the habit of our *orpheus*. In these more open places, after singing vehemently for a time unanswered by any other straggler of the species, it will be observed to fly away to some more distant clump to repeat there the same song in the same solitary mood. It seems to me never tempted from the sea-bord hills, where it alone nestles. Its favorite attractions are the karata-aloes. When these have blossomed and the honey is pouring from the seed vessels in perfect streams, some three or four birds will be seen on the same stem of clustered flowers, drinking at the running cups and singing every now and then. They bring to my mind Teniers' pictures of merry-topers at a road-side tavern. We never see the birds searching the thickets; they seem to have gone where they may feed and sing, and sing and feed, without moving. We may set this down as certain that, in the strolls these birds make away from their customary sea-side hills and savannas, they never go beyond the influence of the sea breeze. They limit themselves to its well-known marine freshness. At the time when the opuntias or torch-thistle cactuses are in fruit, among the arid scrubs at the sea side, the *orpheus* is common enough and plentiful, and the morning and evening song will remind one, in its full mellow tone, of the Black-bird in an English summer.

The nest of the *orpheus* exactly resembles that of the *polyglottus*,—an outer frame work of sticks, spotted with moss and lichens, with an inner cup, very nicely rounded, composed of dry grass. It lays some four eggs of a *greenish drab*, speckled and spotted with umber. I never have seen the nestlings, nor have I even seen the bird caged.

If by *fascia alba* Linnæus means a white bar on the wing, the description would be inaccurate. The lesser wing coverts and the quills are edged with white. If by *fascia* he means a fillet or bordering, he is right. The plumage is a light umber, an ashy umber, slightly graduating into drab at the rump, with the shafts of the feathers of a ruddy hue, and the webs somewhat blue-brown. The two outer tail feathers have white inner webs as well as white outer, with a centre of black. The termination is white. The throat and breast are dashed with brown markings. The under plumage is not white, but ashy, with a faint hue of brown. The bill is ebony black, but the tarsus and toes blue-black.

* See page 291. (B.)

Synonymy of the species of STREPOMATIDÆ, a Family of Fluviatile Mollusca, inhabiting North America.

Part I.

BY GEORGE W. TRYON, JR.

The following synonymy of the very numerous species of North American shells, heretofore considered Melanians, is offered as the result of a year's study of the extensive collections of the Smithsonian Institution and of the Academy of Natural Sciences, as well as those of Messrs. Lea, Haldeman, Anthony, and Gould, together with my own, and several smaller collections.

The present publication is preliminary to that of a complete illustrated Monograph of the Family, prepared at the request of the Smithsonian Institution, (the MSS. of which is nearly completed); and is intended to invite criticism.

Naturalists are requested to communicate to the author, without delay, any information they may possess regarding any of the species.

As many of these species, being rare, have not been sufficiently studied to determine satisfactorily their true position with regard to allied forms, or in other words, their range of variation, it is particularly requested that Naturalists residing near localities inhabited by the *Strepomatidæ*, would collect and transmit to the Smithsonian Institution, extensive suites of specimens, for which, if desired, a named suite will be returned.

Family *STREPOMATIDÆ*, Haldeman.

Strepomatidæ, Hald., Proc. Acad. Nat. Sci., Sept. 1863.

Melaniana, Lam., Extr. d' un Cours., 1812. Hist. Anim. Sans. Vert., vi. p. 163, 1822. Edit. 2, viii. p. 425, 1838. Deshayes, Encyc. Meth., iii. p. 431 and 553, 1832. Reeve, Zool. Proc., p. 76, 1841. Conch. Syst., ii. p. 119, 1842. Sowerby, Conch. Man., Ed. 2, p. 187, 1842. Catlow, Conch. Nomenc., p. 185, 1845.

Melanidæ, (part) Latreille, Fam. Nat., 1825. Lea, Proc. Philos. Soc., iii. p. 164, 1843.

Melanianæ, (part) Swainson, Malacol, p. 198, 340, 1840.

Melaniadæ, (part) Gray, Syn. Brit. Mus., 1840. Turton's Manual, ed. 2, p. 79, 85. Zool. Proc., part 15, p. 152, 1847.

Melaniidæ, (part) Adams, Genera, p. 293, 1854.

Ceriphasinæ, Gill, Proc. Acad. Nat. Sci., p. 34. 35, Feb. 1863.

Synopsis of Genera.

A. Aperture produced into a more or less obvious canal in front. *Trypanostomoid Section.*

1. Shell fusiform, inflated, spire and canal produced, columella without deposit of nacre ..... Genus *Io*, Lea.
   Shell conical or oval, canal not so much produced ..... Subgenus *Pleurocera*, Raf.
2. Shell oval, or turbiniform, or fusiform, with a revolving row of nodules on the periphery, canal short. Columella callously thickened above and below ..... Genus *Angitrema*, Hald.
   Shell oval or oblong, smaller, either smooth or adorned with nodules around the upper portion of the body whorl ..... Subgenus *Lithasia*, Hald.
   Canal retrorse ..... Subgenus *Strephobasis*, Lea.

B. Aperture merely angulated in front, with no canal, and the columella perfectly plain, not twisted, frequently callously thickened above. *Goniobasic Section.*

3. Shell heavy, oval, oblong, or turrited, aperture entire above..... ... Genus *Goniobasis*, Lea.
4. Aperture with a sutural, pleurotomose slit above..... Genus *Schizostoma*, Lea.

C. Aperture entire and rounded in front.

5. Shell oval, heavy, columella callously thickened above..... Genus *Anculosa*, Say.

Genus IO, Lea.

Io, Lea, Trans. Phil. Soc., iv. p. 122, 1831. Sowerby, Conch. Man. 2d Edit., p. 167, 1842. DeKay, Moll. New York, p. 103, 1843. Hermannson, Indicis Generum Malacozoorum, p. 562, 1846.

Io, Lea, (sp.) Gray, Proc. Zool. Soc., pt. 15, p. 153, 1847. Jay, Catalogue, 4th Edit., p. 277, 1852. H. and A. Adams, Genera i. p. 299. Chenu, Man. de Conchyl. i. p. 290, 1859. Anthony, Proc. Acad. Nat. Sci., p. 69, 1860. Reeve, Monog. Io, April, 1860. Binney, Check List, June, 1860. Brot, Cat. Syst. des Mélaniens, p. 29, 1862.

Melafusus, Swainson, Malacol. p. 201, 341, 1840. Woodward, Manual, p. 131, 1851.

Fusus, (sp.) Say, Jour. Acad. Nat. Sci., 1st series, v. pt. 1, p. 129, Nov., 1825.

Melania, (sp.) Catlow and Reeve, Conch. Nomenc., 1845.

SPECIES.

A. *Shell smooth or only slightly tuberculate.*

1. I. fluvialis, Say.

Fusus fluvialis, Say, Jour. Acad. Nat. Sci., v. p. 129, Nov. 1825. Conrad, New Fresh Water Shells, p. 12.

Io fluvialis, Say, Binney, Check List, No. 400.

Pleurocera fluvialis, Say, Haldeman, Iconog. Encyc., ii. p. 84.

Io fluviatilis, Say, Woodward, Manual, t. 8, f. 27. Hanley, Conch. Misc., t. 6, f. 50. Reeve, Monog. Io, t. 1, f. 5. Brot, List, p. 29.

Io fusiformis, Lea, Phil. Trans., iv. p. 122, t. 15, f. 37. a. b. Obs., i. p. 132. Ravenel. Cat., p. 11. Reeve, Monog. Io, t. 1, f. 6. DeKay, Moll. N.Y., p. 103. Wheatley, Cat. Shells U. S., p. 28. Jay, Cat. 4th Edit., p. 277. Troost, Cat.

Io tenebrosa, Lea, Philos. Proc., ii. p. 34, April, 1841. Phil. Trans., ix. p. 17. Obs. iv. p. 17. Wheatley, Cat. Shells U. S., p. 29. Binney, Check List, No. 404.

Io verrucosa, Reeve, Monog. Io, t. 1, f. 2, April, 1860. Brot, List, p. 29.

2. I. inermis, Anthony.

Io inermis, Anthony, Proc. Acad. Nat. Sci., Feb. 1860, p. 70. Binney, Check List, No, 401. Reeve, Monog. Io, t. 3, f. 21.

Io lurida, Anthony, Reeve, Monog. Io, t. 3, f. 20.

B. *Shell spinose.*

3. I. spinosa, Lea.

Io spinosa, Lea, Philos. Trans., v. p. 112, t. 19, f. 79. Obs., i. p. 224. Troost, Cat. Wheatley, Cat. Shells U. S., p. 29. Jay, Cat. 4th Edit., p. 277. Binney, Check List, No. 402. Reeve, Monog. Io, t. 1. f. 7.

Io gibbosa, Anthony, Reeve, Monog. Io, t. 3, f. 17.

Io recta, Anthony, Reeve. Monog. Io, t. 3, f. 21.

Io rhombica, Anthony, Reeve, Monog. Io, t. 3, f. 16.

4 I. brevis, Anthony.
Io brevis, Anthony, Proc. Acad. Nat. Sci., Feb. 1860, p. 69. Binney, Check List, No. 399. Reeve, Monog. Io, t. 1. f. 4.
Io Spirostoma, Anthony, Proc. Acad. Nat. Sci., Feb. 1860, p. 70. Binney, Check List, No. 403. Reeve, Monog. Io, t. 1, f. 1.

5. I. turrita, Anthony.
Io turrita, Anthony, Proc. Acad. Nat. Sci., Feb. 1860, p. 69. Binney, Check List, No. 405. Reeve, Monog. Io, t. 3, f. 19.

Spurious Species.

Io nodosa, *robusta*, *variabilis*, *Spillmanii*, *modesta*, *viridula*, *gracilis*, *nobilis*, of Lea.
These are species of Pleurocera.

Subgenus PLEUROCERA, Rafinesque.

Pleurocera, Rafinesque, Jour. de Phys. Bruxelles, tome 88, p. 423, 1819. Blainville, Dict. Sc. Nat., xxxii. p. 236, 1824, xli. p. 376, 1826, Man. Malacologie, p. 441, 1825. Rang, Man. Conchyl. p. 374, 1829. Menke, Syn. Method, Edit. 2, p. 43, 1830. Ferussac, Bull. Zool., p. 93, 1835. Sowerby, Conch. Man. Edit. 2, p. 231, 1842. Hermannson, Indicis Gen. Malacoz., i. p. 296. 1846. Haldeman, Iconog. Encyc., p. 84.
Ceriphasia, Swainson, Malacol., p. 204, 342, 1840. Gray, Syn. Brit. Mus., 1844. Hermannson, Indic. Gen. Mal., i. p. 208, 1846. Gray, Zool. Proc. pt. 15, p. 153, 1847. H. and A. Adams, Genera, Recent, Moll. i. p. 297, 1854. Chenu, Manuel de Conchyl. i. p. 288, 1859.
Telescopella, Gray, Proc. Zool. Soc., pt. 15, p. 153, 1847.
Elimia, (part) H. and A. Adams, Genera, i. p. 300, 1854. Chenu, Man. de Conchyl .i. p. 290, 1859.
Megara, (part) H. and A. Adams, Genera, i. p. 306, 1854. Chenu, Man. de Conchyl. i. p. 293, 1859.
Trypanostoma, Lea, Proc. Acad. Nat. Sci., p. 169, April 1862. Jour. Acad. Nat. Sci., 2d ser. v. pt. 3, p. 268, March, 1863. Obs., ix. p. 90, March, 1863.
Melania, (sp.) of authors. Binney, Check List. Reeve, Monog. Mel., Nov., 1859, to June, 1861. Brot, Cat. Syst., p. 30, 1862.

SPECIES.

A. *Tuberculate.*

1. P. alveare, Conrad.
Melania alveare, Conrad, New Fresh Water Shells, p. 54, t. 4, f. 7, 1834. DeKay, Moll. N. Y., p. 94. Wheatley, Cat. Shells U. S., p. 24. Jay, Cat. 4th Edit., p. 272. Binney, Check List, No. 11. Brot, List, p. 30. Hanley, Conch. Misc., t. 8, f. 74.
Megara alveare, Conrad, Chenu, Manual, i. f. 2022.
Melania torquata, Lea, Philos. Proc., ii. p. 242, Dec., 1842. Philos. Trans. ix. p. 27. Obs., iv. p. 27. Wheatley, Cat. Shells U. S., p. 27. Binney, Check List, No. 271.
Melania pernodosa, Lea, Philos. Proc. iv. p. 105, Aug., 1845. Philos. Trans. x. p. 66, t. 9, f. 49. Obs., iv. p. 66, t. 9, f. 49. Binney, Check List, No. 202.
Melania nupera, Say, (young) American Conchol. pt. 1, t. 8, middle figure.
Melania producta,* Lea, Philos. Proc., ii. p. 243, Dec., 1842. Philos. Trans., ix. p. 28. Obs., iv. p. 28. Wheatley, Cat. Shells, U. S., p. 26. Binney, Check List, No. 217. Brot, List, p. 36.
Melania grossa,* Anthony, Proc. Acad. Nat. Sci., p. 59, Feb., 1860. Brot, List, p. 40. Reeve, Monog. f. 411.

* *M. productum* and *grossa* are the young of a large variety of *alveare*.

2. P. Foremani,* Lea.
Melania Foremani, Lea, Philos. Proc., ii. p. 242. Philos, Trans., ix. p. 27. Obs., iv. p. 27. Binney, Check List, No. 111. Brot. List, p. 30. Reeve, Monog., f. 432.
Melania Foremanii, Lea, Wheatley, Cat. Shells, U. S., p. 25.

3. P. undulatum,† Say.
Melania undulata, Say, New Harmony Dissem., p. 261. Reprint, p. 17. Binney's Edit., p. 142. Reeve, Monog., f. 307. Haldeman, Am. Jour. Sci., xlii. p. 216, Dec., 1841. Anthony's List, 1st and 2d Edit. DeKay, Moll. N. Y., p. 92. Wheatley, Cat. Shells U. S., p. 27. Jay, Cat., 4th Edit., p. 275. Binney, Check List, No. 281. Brot. List, p. 31. Hanley, Conch. Misc., t. 1, f. 10. Catlow, Conch. Nomenc. p. 189.
Megara undulata, Say, Chenu, Man. Conchyl. i. f. 2025,

4. P. excuratum, Conrad.
Melania excurata, Conrad, New Fresh Water Shells, p. 49, t. 4, f. 6, 1834. Anthony, List, 1st and 2d Edit. Jay, Cat., 4th Edit., p. 273. DeKay, Moll. N. Y., p. 96. Binney, Check List, No. 103.
Melania excurvata,‡ Conrad, Wheatley, Cat. Shells U. S., p. 25.
Melania rorata, Reeve, Monog. Mel., sp. 306. Brot. List., p. 31.
Io Spillmanii,§ Lea, Proc. Acad. Nat. Sci., p. 394, 1861. Jour. Acad. Nat. Sci., v. pt. 3, p. 348, t. 39, f. 215. Obs. ix. p. 170.

5. P. moniliferum,‖ Lea.
Trypanostoma moniliferum, Lea, Proc. Acad. Nat. Sci., p. 172, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 295, t. 36, f. 125, March, 1863. Obs., ix. p. 117.
Io nodosa, Lea, Proc. Acad. Sci. p. 393, 1861. Jour. Acad. Nat. Sci., v. pt. 3, p. 346, t. 39, f. 212, March, 1863. Obs., ix. p. 168.
Io variabilis,¶ Lea, Proc. Acad. Nat. Sci., p. 393, 1861. Jour. Acad. Nat. Sci., v. pt. 3, p. 347, t. 39, f. 214, March, 1863. Obs., ix. p. 169.

6. P. nobile, Lea.
Melania nobilis, Lea, Philos. Proc., iv. p. 165, Aug., 1845. Philos. Trans. x. p. 65, t. 9, f. 48. Obs., iv. p. 65. Binney, Check List, No. 179.

7. P. robustum,** Lea.
Io robusta, Lea, Proc. Acad. Nat. Sci., p. 393, 1861. Jour. Acad. Nat. Sci., v. pt. 3, p. 346, t. 39, f. 213, March, 1863. Obs. ix. p. 168.

B. *Sulcate.*††

8. P. canaliculatum, Say.
Melania canaliculata, Say, Jour. Acad. Nat. Sci., ii. p. 175, January, 1821.

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* = *Prasinatum*, Conrad?
† = *Canaliculatum*, Say?
‡ The typical *excuratum* differs widely enough from *undulatum* Say, but there exist intermediate forms of a nature to perplex the naturalist. Among these may be mentioned *ponderosum*, Anth., (*dux*, Lea) with the tubercles and canal nearly obsolete, and the revolving striæ very faint, so that the surface of the shell appears at first sight to be flat and smooth; also *annuliferum*, Con., in which the revolving lines are more strongly developed. These shells partake of one general type, and form a natural group of closely related species *at the least.*
§ Juvenile shell.
‖ Not so narrow in its proportions as *excuratum*, more frequently banded, and having the upper whorls of the spire smooth, whereas in *excuratum* they are striate. This difference is more apparent in comparing young specimens.
¶ Juvenile shell.
** Not so much angled on the periphery as *undulatum*, with the inferior portion of the body whorl longer and more convex. It bears the same general relation to *undulatum* as *Troostii* does to *canaliculatum*: and the four may be but one species.
†† The deep sulcus which distinguishes Mr. Say's *Melania canaliculata* in its typical form, shades off so gradually into a smooth flatteued surface, that not only is it difficult to arrange the species of this group, but it is even doubtful whether many of the species which are placed in other groups are really distinct.

Binney's Reprint, p. 65. Binney, Check List, No. 45. DeKay, Moll. N. Y., p. 94. Wheatley, Cat. Shells U. S., p. 24. Ravenel, Cat., p. 11. Jay, Cat., 4th Edit., p. 273. Anthony, List, 1st and 2d Edit. Kirtland, Report Zool. Ohio, p. 174. Catlow, Conch. Nomenc., p. 185. Brot, List, p. 30. Reeve, Monog. Mel., sp. 304.

Ceriphasia canaliculata, Say, Chenu, Manuel, Conchyl. i. f. 1959.

Melania conica,* Say, Jour. Acad. Nat. Sci., ii. p. 176, January, 1821. Binney's Reprint, p. 70. Binney, Check List, No. 65. Reeve, Monog. Mel., sp. 252. DeKay, Moll., N. Y., p. 95. Ravenel, Cat., p. 11. Haldeman, Monog. Limniades, No. 7, p. 4 of Cover. Brot. List, p. 30. Kirtland, Rep. Zool. Ohio, p. 174. Anthony, List, 1st and 2d Edit. Jay, Cat., 4th Edit., p. 273. Wheatley, Cat. Shells U. S., p. 24. Catlow, Conch. Nomenc., p. 186.

Melania substricta,† Haldeman, Suppl. to Monog. of Limniades.

Strombus Sayi, Wood, Index Testaceol. Suppl., t. 4, f. 24.

Melania Sayi, Wood. Short and Eaton, Notices, p. 82. Anthony, List, 1st and 2d Edit.

Melania Sayi, Ward. Wheatley, Cat. Shells U. S., p. 27.

Melania Sayii, Ward. Kirtland, Rept. Zool. Ohio, p. 174. Jay, Cat., 4th Edit., p. 274. Higgins, Cat., p. 7.

Melania Sayii, Deshayes, Catlow, Conch. Nomenc., p. 188.

Melania exarata, Menke, Syn. Meth., p. 135, 1830. Binney, Check List, No. 100.

Melania ligata, Menke, Syn. Meth., p. 136, 1830. Binney, Check List, No. 162.

Melania auriscalpium, Menke, Syn. Meth., p. 136, 1830. Binney, Check List, No. 25.

9. P. filum,‡ Lea,

Melania filum, Lea, Philos. Proc., iv. p. 165. Philos. Trans., x. p. 62, t. 9, f. 41. Obs., iv. p. 62. Binney, Check List, No. 109. Brot, List, p. 30. Reeve, Monog. Mel., sp. 402?

Elimia filum, Lea, Chenu, Man. Conchyl. i. f. 1980.

10. P. ponderosum,§ Anthony.

Melania ponderosa, Anthony, Proc. Acad. Nat. Sci.. Feb., 1860, p. 59. Binney, Check List, No. 213. Brot, List, p. 59.

Trypanostoma dux, Lea, Proc. Acad. Nat. Sci., p. 170, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 283, t. 36, f. 105. Obs., ix. p. 105.

11. P. olivaceum, Lea.

Trypanostoma olivaceum, Lea, Proc. Acad. Nat. Sci., p. 172, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 290, t. 36, f. 117. Obs., ix. p. 112.

12. P. Troostii,‖ Lea.

Trypanostoma Troostii, Lea, Proc. Acad. Nat. Sci., p. 171, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 285, t. 36, f. 107. Obs., ix. p. 107.

Trypanostoma viride,¶ Lea, Proc. Acad. Nat. Sci., p. 172. 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 291, t. 36, f. 119. Obs., ix. p. 113.

Trypanostoma ligatum,** Lea, Proc. Acad. Nat. Sci., p. 171, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 288, t. 36, f. 114. Obs., ix. p. 110.

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* Juvenile shell.

† Proposed under the impression that *conica* was preoccupied.

‡ Distinguished from *canaliculatum* by its more elevated spire, more prominent carina, and flattened whorls. It almost entirely replaces *canaliculatum* in the waters of Tennessee, and if specifically identical with that species, must at least be distinguished as a local variety.

§ Appears to be doubtfully distinct from *canaliculatum*, *excuratum*, &c. It is doubtful, indeed, whether the whole group contains more than one species.

‖ More inflated and more convex than *canaliculatum*, with the inferior half of the body whorl longer and more convex.

¶ ** Young shells of *Troostii* in different stages of growth.

13. P. moriforme, Lea.
Trypanostoma moriforme, Lea, Proc. Acad. Nat. Sci., p. 172, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 290, t. 36, f. 118. Obs., ix. p. 112.

14. P. Pybasii, Lea.
Trypanostoma Pybasii, Lea, Proc. Acad. Nat. Sci., p. 172, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 289, t. 36, f. 115. Obs., ix. p. 111.

15. P. Showalterii, Lea.
Trypanostoma Showalterii, Lea, Proc. Acad. Nat. Sci., p. 172, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 293, t. 36, f. 122. Obs., ix. p. 115.

C. *Angulate, striate below the periphery.*

16. P. Thorntonii,* Lea.
Trypanostoma Thorntonii, Lea, Proc. Acad. Nat. Sci., p. 170, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 284, t. 36, f. 106. Obs., ix. p. 106.

17. P. infrafasciatum, Anthony.
Melania infrafasciata, Anthony, Proc. Acad. Nat. Sci., p. 57, Feb., 1860. Binney, Check List, No. 148. Brot. List, p. 30. Reeve, Monog. Melania, sp. 301.

18. P. Postellii,† Lea.
Trypanostoma Postellii, Lea, Proc. Acad. Nat. Sci., p. 171, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 286, t. 36, f. 110. Obs., ix. p. 108.

19. P. incurvum,‡ Lea.
Trypanostoma incurvum, Lea, Proc. Acad. Nat. Sci., p. 171, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 286, t. 36, f. 109. Obs., ix. p. 108.

20. P. Alabamense,§ Lea.
Trypanostoma Alabamense, Lea, Proc. Acad. Nat. Sci., p. 171, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 288, t. 36, f. 113. Obs., ix. p. 110.

21. P. Florencense,‖ Lea.
Trypanostoma Florencense, Lea, Proc. Acad. Nat. Sci., p. 171, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 287, t. 36, f. 112. Obs. ix. p. 109.

22. P. canalitium, Lea,
Trypanostoma canalitium, Lea, Proc. Acad. Nat. Sci., p. 175, 1862. Jour. Acad. Nat. Sci,, v. pt. 3, p. 292, t. 36, f. 121. Obs., ix. p. 114.

23. P. Clarkii,¶ Lea.
Trypanostoma Clarkii, Lea, Proc. Acad. Nat. Sci., p. 171, 1862. Jour. Acad. Nat Sci., v. pt. 3, p. 285, t. 36, f. 108. Obs., ix. p. 107.

24. P. Anthonyi, Lea.
Trypanostoma Anthonyi, Lea, Proc. Acad. Nat. Sci., p. 172, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 293, t. 36, f. 123. Obs., ix. p. 115.

25. P. prasinatum, Conrad.
Melania prasinata,** Conrad, Am. Jour. Sci., 1st ser. xxv. p. 342, t. 1, f. 14, January, 1834. Jay, Cat., 4th Edit., p. 274. Binney, Check List,

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* This species is shorter in the canal, has broader bands, and wants the tubercles of *moniliferum*, which it otherwise much resembles.

† Distinguished from *infrafasciatum* by its whorls being more flattened, and by its narrow form.

‡ Differs from *Postellii* by its singularly incurved edge of the outer lip.

§ Very distinct from the preceding two species in the more developed spire and canal.

‖ Inhabits the waters of Indiana, also. No. 20, (*Alabamense*) may prove to be the young of this species.

¶ Doubtfully distinguished from *canalitium* by its broader proportions, better developed carina and recurved canal.

** The figure given by Mr. Conrad is not a good representation of this species.

No. 216. Brot, List, p. 33. Catlow, Conch. Nomenc., p. 188. DeKay Moll. N. Y., p. 98. Reeve, Monog. Melania, sp. 403,

Melania incrassata, Anthony, Ann. Lyc. N. Y., vi. p. 99, t. 2. f. 17, March, 1854. Binney, Check List, No. 144. Brot. List, p. 34.

Trypanostoma Hartmanii, Lea, Proc. Acad. Nat. Sci., p. 173, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 270, t. 36, f. 80. Obs. ix. p. 92.

Trypanostoma Jayi, Lea, Proc. Acad. Nat. Sci., p. 173. 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 270, t. 36, f. 81. Obs., ix. p. 92.

26. P. tortum, Lea.

Trypanostoma tortum, Lea, Proc. Acad. Nat. Sci., p. 174, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 275, t. 36, f. 89. Obs., ix. p. 97.

27. P. dignum, Lea.

Trypanostoma dignum, Lea, Proc. Acad. Nat. Sci., p. 273, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 350, t. 39, f. 219. Obs., ix. p. 172.

D. *Carinate, striate Pleurocerœ.*

28. P. bicostatum, Anthony.

Melania bicostata, Anthony, Proc. Acad. Nat. Sci., p. 56, February, 1860. Binney, Check List, No. 33. Brot. List, p. 30. Reeve, Monog. Melania, sp. 246.

Melania rigida,* Anthony, Proc. Acad. Nat. Sci., p. 62, February, 1860. Binney, Check List, No. 229. Reeve, Monog. Melania, sp. 270.

29. P. subulare, Lea.

Melania subularis, Lea, Philos. Trans., iv. p. 100, t. 15, f. 30. Obs., i. p. 110, t. 15, f. 30. Ravenel, Cat., p. 11. DeKay, Moll. N. Y., p. 92, t. 7, f. 138. Wheatley, Cat. Shells U. S., p. 27. Jay, Cat., 4th Edit., p. 275. Binney, Check List, No. 257. Brot, List, p. 35. Reeve, Monog. Melania, sp. 428. Whiteaves, Canad. Naturalist, viii. p. 102, April, 1863.

30. P. subulæforme, Lea.

Trypanostoma subulæforme, Lea, Proc. Acad. Nat. Sci., p. 174, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 289, t. 36, f. 116. Obs., ix. p. 111.

31. P. Henryanum,* Lea.

Trypanostoma Henryanum, Lea, Proc. Acad. Nat. Sci., p. 272, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 351, t. 39, f. 222. Obs., ix. p. 173.

32. P. Lewisii,† Lea.

Trypanostoma Lewisii, Lea, Proc. Acad. Nat. Sci., p. 172, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 292, t. 36, f. 120. Obs., ix. p. 114.

33. P. annuliferum, Conrad.

Melania annulifera, Conrad, New Fresh Water Shells, p. 51, t. 8, f. 2, 1834. Jay, Cat., 4th Edit., p. 272. Binney, Check List, No. 17. DeKay, Moll. N. Y., p. 94. Wheatley, Cat. Shells U. S., p. 24. Brot. List, p. 30. Catlow, Conch. Nomenc., p. 185. Reeve,* Monog. Melania, sp. 308.

Melania annulata, Conrad, Jay, Cat., 2d Edit., p. 455.

Melania Ordiana, Lea, Philos. Proc., ii. p. 242, Dec., 1842. Philos. Trans. ix. p. 26. Obs., iv. p. 26. Wheatley, Cat. Shells U. S., p. 26. Binney, Check List, No. 191. Brot, List, p. 30.

34. P. Brumbyi, Lea.

Melania Brumbyi, Lea, Philos. Trans., x. p. 298, t. 30, f. 5. Obs., v. p.

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* Juvenile shell,

† Probably the young of *subulæforme*.

‡ This may only be a striate form of *elevatum*, Say.

§ Mr. Reeve's figure represents the variety described by Mr. Lea as *Mel. Ordiana*.

54. Binney, Check List, No. 40. Brot. List, p. 30. Reeve, Monog. Melania, sp. 277.

35. P. Currierianum, Lea.
Trypanostoma Currierianum, Lea, Proc. Acad. Nat. Sci., p. 155, May, 1863.

E. *Plicate Pleuroceras.*

36. P. Sycamorénse, Lea.
Trypanostoma Scyamorénse, Proc. Acad. Nat. Sci., p. 175, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 283, t. 36, f. 104. Obs., ix. p. 105.

37. P. plicatum, Tryon.
Pleurocera plicatum, Tryon, Proc. Acad. Nat. Sci., Oct., 1863.

F. *Smooth, Angulate Pleurocerœ.*

38. P. elevatum,* Say.
Melania elevata, Say, Jour. Acad. Nat. Sci., ii. p. 176, Jan'y, 1821. Binney, Reprint, p. 70. Binney, Check List, No. 97. Jay, Cat., 4th Edit., p. 273. Lapham, Cat. Moll. Wisconsin, p. 368. DeKay, Moll. N. Y., p. 96. Wheatley, Cat. Shells U. S., p. 25. Catlow, Conch. Nomenc., p. 186. Brot. List, p. 30. Reeve, Monog. Melania, sp. 442.
Ceriphasia elevata, Say, Chenu, Manuel, i. f. 1961.
Melania elongata, Lea, Philos. Trans., iv. p. 121, t. 15, f. 29. Obs., i. p. 130. Troost, Cat. Binney, Check List, No. 99. Wheatley, Cat. Shells U. S., p. 25. Brot, List, p. 30.
Ceriphasia elongata, Lea, Chenu, Manuél, i. f. 1959.

39. P. gradatum, Anthony.
Melania gradata, Anthony, Ann. Lyc. N. Y., vi. p. 112, t. 3, f. 12, March, 1854. Binney, Check List, No. 130. Brot. List, p. 30. Reeve, Monog. Melania, sp. 261.
Melania eximia,† Anthony, Ann. Lyc. N. Y., vi. p. 107, t. 3, f. 7, March, 1854. Binney, Check List, No. 106. Brot. List, p. 58. Reeve, Monog. Melania, sp. 408.
Trypanostoma curtatum, Lea, Proc. Acad. Nat. Sci., p. 155, May, 1863.

40. P. aratum, Lea.‡
Melania aratum, Lea, Philos. Proc., ii. p. 242, Dec., 1842. Philos. Trans., ix. p. 24. Obs., iv. p. 24. DeKay, Moll. N. Y., p. 98. Brot, List, p. 30.
Melania exarata, Lea, Philos. Proc. ii. p. 14, Feb., 1841. Philos. Trans., viii. p. 183, t. 6, f. 44. Obs., iii. p. 21. Troost, Cat. Binney, Check List, No. 101. Catlow, Conch. Nomenc., p. 186.

41. P. lativittatum, Lea.
Trypanostoma lativittatum, Lea, Proc. Acad. Nat. Sci., p. 273, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 352, t. 39, f. 223. Obs., ix. p. 174.

41, a. P. strictum, Lea.§
Trypanostoma strictum, Lea, Proc. Acad. Nat. Sci., p. 272, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 352, t. 39, f. 224. Obs., ix. p. 174.

42. P. modestum, Lea.
Io modesta, Lea, Proc. Acad. Nat. Sci., p. 394, 1861. Jour. Acad. Nat. Sci., v. pt. 3, p. 348, t. 39, f. 216. Obs., ix. p. 170.

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* *Lewisii* may prove to be a variety of this species.
† Juvenile shell.
‡ = Preceding?
§ *P. lativittatum* has a line below the angle of the periphery, which this species has not.

43. P. Leaii, Tryon.*
Io viridula, Lea, Proc. Acad. Nat. Sci., p. 394, 1861. Jour. Acad. Nat. Sci., v. pt. 3, p. 349, t. 39, f. 218. Obs., ix. p. 171.

44. P. fastigiatum, Anthony.
Melania fastigiata, Anthony, Ann. N. Y. Lyc., vi. p. 113, t. 3, f. 13, March, 1854. Binney, Check List, No. 108. Brot. List, p. 30. Reeve, Monog. Melania, sp. 302.

45. P. Tuomeyi, Lea.
Trypanostoma Tuomeyi, Lea, Proc. Acad. Nat. Sci., p. 171, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 287, t. 36, f. 111. Obs., ix. p. 109.

46. P. gracile, Lea,
Io gracilis, Lea, Proc. Acad. Nat. Sci., p. 394, 1861. Jour. Acad. Nat. Sci., v. pt. 3, p. 349, t. 39, f. 217. Obs., ix. p. 171.

47. P. Spillmanii, Lea.
Trypanostoma Spillmanii, Lea, Proc. Acad. Nat. Sci., p. 173, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 271, t. 36, f. 82. Obs., ix. p. 86.

48. P. planogyrum, Anthony.
Melania planogyra, Anthony, Ann. Lyc. N. Y., vi. p. 111, t. 3, f. 11, March, 1854. Binney, Check List, No. 207. Brot, List, p. 30. Reeve, Monog. Melania, sp. 382.

49. P. pyrenellum, Conrad.
Melania pyrenella, Conrad, New Fresh Water Shells, p. 52, t. 8, f. 5, 1834. DeKay, Moll. N. Y., p. 99. Wheatley, Cat. Shells U. S., p. 26. Binney, Check List, No. 226. Brot, List, p. 30. Reeve, Monog. Melania, sp. 303.

50. P. Conradi,† Tryon.

51. P. regulare, Lea.
Melania regularis, Lea, Philos. Proc., ii. p. 12, Feb., 1841. Philos. Trans., viii. p. 170, t. 5, f. 16. Obs., iii. p. 8. DeKay, Moll. N. Y., p. 94. Higgins, Cat. Troost, Cat. Jay, Cat., 4th Edit., p. 274. Wheatley, Cat. Shells U. S., p. 26. Binney, Check List, No. 227. Catlow, Conch. Nomenc., p. 188. Brot, List, p. 30.
Ceriphasia regularis, Lea, Chenu, Manuél, i. f. 1956.

52. P. validum, Anthony.
Melania valida, Anthony, Proc. Acad. Nat. Sci., p. 59, Feb., 1860. Binney, Check List, No. 282. Brot, List, p. 33. Reeve, Monog. Melania, sp. 317.

G. *Smooth species, not angulated.*

53. P. glandulum, Anthony.
Melania glandula, Anthony, Proc. Acad. Nat. Sci., p. 60, Feb., 1860. Binney, Check List, No. 124. Brot, List, p. 39. Reeve, Monog. Melania, sp. 393.
Melania glans, Anthony, Ann. N. Y. Lyc., vi. p. 123, t. 3, f. 23. March, 1354.

54. P. Christyi,‡ Lea.

* The name *viridula* being preoccupied by Mr. Anthony, I gladly avail myself of the opportunity to dedicate this species to a gentleman who, by his immense labors pursued during a period of nearly forty years, with their splendid results, has done more for the science of Conchology, than any other American Naturalist.

† This name is proposed for a long slender species, with flattened whorls and brown color, which Mr. Anthony has extensively distributed as *pyrenellum*, Conrad. Mr. Lea has regarded it as doubtfully identical with his *elongatum*.

‡ Distinguished from *labiatum* principally by its more ponderous, flattened volutions.

Trypanostoma Christyi, Lea, Proc. Acad. Nat. Sci., p. 173, 1862. Jour. Acad. Nat. Sci., v. pt. 3, 272, t. 36, f. 83. Obs., ix. p. 94.

55. P. labiatum,* Lea.
Trypanostoma labiatum, Lea, Proc. Acad. Nat. Sci., p. 173, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 272, t. 36, f. 84. Obs., ix. p. 94.
Trypanostoma pallidum, Lea, Proc. Acad. Nat. Sci., p. 174, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 275, t. 36, f. 90. Obs., ix. p. 97.

56. P. neglectum, Anthony.
Melania neglecta, Anthony, Ann. Lyc. N. Y., p. 128, t. 3, f. 29, March, 1854. Binney, Check List, No. 173. Brot. List, p. 34. Currier, Shells of Grand River Valley, Mich., 1859. Reeve, Monog. Melania, sp. 247.

57. P. vestitum, Conrad.
Melania vestita, Conrad, New Fresh Water Shells, p. 57, t. 8, f. 12, 1834. DeKay, Moll. N. Y., p. 101. Wheatley, Cat. Shells U. S., p. 27. Binney, Check List, No. 287. Brot. List, p. 31. Reeve, Monog. Melania, sp. 322.
Melania mucronata,† Lea, Proc. Acad. Nat. Sci., p. 119, 1861.
Trypanostoma mucronatum, Lea, Jour. Acad. Nat. Sci., v. pt. 3, p. 277, t. 36, f. 93. Obs., ix. p. 99.

58. P. strigosum, Lea.
Melania strigosa, Lea, Philos. Proc., ii. p. 13, Feb., 1841. Philos. Trans., viii. p. 175, t. 5, f. 24. Obs., iii. p. 131. DeKay, Moll., N. Y., p. 95. Troost, Cat. Binney, Check List, No. 250. Wheatley, Cat. Shells U. S., p. 27. Catlow, Conch. Nomenc., p. 188. Brot. List, p. 38. Reeve, Monog. Melania, sp. 320.

59. P. tenebrocinctum, Anthony.
Melania tenebrocincta, Anthony, Proc. Acad. Nat. Sci., p. 58, Feb., 1860. Binney, Check List, No. 266. Brot. List, p. 31. Reeve, Monog. Melania, sp. 271.
Trypanostoma parvum, Lea, Proc. Acad. Nat. Sci., p. 174, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 276, t. 36, f. 91. Obs., ix. p. 98.

60. P. Vanuxemii, Lea.
Trypanostoma Vanuxemii, Lea, Proc. Acad. Nat Sci., p. 175, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 280, t. 36, f. 98. Obs. ix. p. 102.

61. P. Chakasahaense, Lea.
Trypanostoma Chakasahaense, Lea, Proc. Acad. Nat. Sci. p. 175, 1862. Jour. Acad. Nat. Sci., v., pt. 3, p. 280, t. 36, f. 99. March, 1863. Obs. ix. p. 102.

62. P. Knoxense, Lea.
Trypanostoma Knoxense, Lea, Proc. Acad. Nat. Sci., p. 175, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 281, t. 36, f. 101. Obs. ix., p. 103.

63. P. altipetum, Anthony.
Melania altipeta, Anthony, Ann. N. Y. Lyc., vi. p. 87, t. 2, f. 5. Binney, Check List, No. 442. Brot. List, p. 34. Reeve, Monog. Mel., sp. 280.

64. P. hastatum, Anthony.
Melania hastata, Anthony, Ann. N. Y. Lyc,, vi. p. 85, t. 2, f. 3, March, 1854. Binney, Check List, No. 136. Brot. List, p. 31. Reeve, Monog. Mel., sp. 394.

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*Larger than *neglectum*, Anth., also more convex, lighter in color and differing in the form of the canal. The typical *pallidum* in Mr. Lea's collections appears distinct, but I have seen numerous specimens collected in different parts of Ohio which connect the two species.

† Having seen author's types of *vestitum*, I have no doubt that *mucronatum* is the same species. Mr. Lea's description refers to the shell when not fully grown; it is curious that in his description he mentions six whorls, and in his "Remarks" he gives it eight, while his figure exhibits ten.

65. P. Lyonii, Lea.
Trypanostoma Lyonii, Lea, Proc. Acad. Nat. Sci., p. 155, May, 1863.

66. P. viridulum, Anthony.
Melania viridula, Anthony, Ann. Lyc. N. Y., vi. p. 84, t. 2, f. 2, March, 1854. Binney, Check List, No. 293. Brot. List, p. 31. Reeve, Monog. Mel., sp. 243.

67. P. unciale, Haldeman.
Melania uncialis, Hald., Monog. Limniades, No. 4, p. 3 of Cover, Oct. 5, 1841. Jay, Cat. 4th Edit., p. 275. Binney; Check List, No. 279. Brot. List, p. 37. Reeve, Monog. Mel. sp. 435.

68. P. sugillatum,* Reeve,
Melania sugillata, Reeve, Monog. Mel., sp. 319, September, 1860. Brot. List, p. 31.

69. P. striatum, Lea.
Trypanostoma striatum, Lea, Proc. Acad. Nat. Sci., p. 173, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 294, t. 36, f. 124. Obs. ix., p. 116.
Trypanostoma rostellatum, Lea, Proc. Acad. Nat. Sci., p. 272, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 353, t. 39, f. 225. Obs. ix., p. 175.

70. P. Knoxvillense,† Lea.
Trypanostoma Knoxvillense, Lea, Proc. Acad. Nat. Sci., p. 173, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 274, t. 36, f. 87. Obs. ix., p. 96.

71. P. Whitei, Lea.
Trypanostoma Whitei, Lea, Proc. Acad. Nat. Sci., p. 173, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 272, t. 36, f. 85. Obs. ix., p. 95.

72. P. attenuatum, Lea.
Trypanostoma attenuatum, Lea, Proc. Acad. Nat. Sci., p. 174, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 274, t. 36, f. 88. Obs. ix., p. 96.

73. P. Estabrookii, Lea.
Trypanostoma Estabrookii, Lea, Proc. Acad. Nat, Sci., p. 173, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 273, t. 36, f. 86. Obs. ix., p. 95.

74. P. modestum, Lea.
Trypanostoma modestum, Lea, Proc. Acad. Nat, Sci., p. 174, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 276, t. 36, f. 92. Obs. ix., p. 98.

75. P. luteum, Lea.
Trypanostoma luteum, Lea, Proc. Acad. Nat. Sci., p. 273, 1863. Jour. Acad. Nat. Sci., v. pt. 3. p. 350, t. 39, f. 220. Obs. ix., p. 172.
Trypanostoma Carolinense, Lea, Proc. Acad. Nat. Sci., p. 273, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 351, t. 39, f. 221. Obs. ix., p. 173.

76. P. curvatum, Lea.
Melania curvata, Lea, Philos. Proc. ii., p. 243. Philos. Trans. ix., p. 28. Obs. ix., p. 28. Wheatley, Cat. Shells U. S., p. 25. Brot. List, p. 30. Binney, Check List, No. 81.

77. P. simplex, Lea.
Trypanostoma simplex, Lea, Proc. Acad. Nat. Sci.. p. 174, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 277, t. 36, f. 94. Obs. ix., p. 99.

78. P. bivittatum, Lea.
Trypanostoma bivittatum, Lea, Proc. Acad. Nat. Sci., p. 175, 1862. Jour. Acad. Nat. Sci. v. pt. 3, p. 279, t. 36, f. 97. Obs. ix., p. 101.

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* This shell appears to be very closely allied to *unciale*, judging from the figure.
† I doubt whether this is distinct from *Sycamorense*.

79. P. trivittatum, Lea.
Trypanostoma trivittatum, Lea, Proc. Acad. Nat. Sci., p. 175, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 282, t. 36, f. 102. Obs. ix., p. 104.

80. P. turgidum, Lea.
Melania turgida, Lea, Philos. Proc. ii. p. 82, Oct. 1841. Philos. Trans. ix., p. 18. Wheatley, Cat. Shells U. S., p. 27. Binney, Check List, No. 278. Brot. List, p. 33.

81. P. minor, Lea.
Trypanostoma minor, Lea, Proc. Acad. Nat. Sci., p. 174, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 278, t. 36, f. 95. Obs. ix., p. 100.

82. P. pumilum, Lea.
Trypanostoma pumilum, Lea, Proc. Acad. Nat. Sci., p. 174, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 279, t. 36, f. 96. Obs. ix., p. 101.

83. P. Tennesseénse, Lea.
Trypanostoma Tennesseénse, Lea, Proc. Acad. Nat. Sci., p. 175, 1862. Jour. Acad. Nat. Sci. v. pt. 3, p. 281, t. 37, f. 100. Obs. ix., p. 103.

84. P. trochulus, Lea.
Trypanostoma trochulus, Lea, Proc. Acad. Nat. Sci., p. 175, 1862. Jour. Acad. Nat. Sci., v. pt. 3, p. 282, t. 37, f. 103. Obs. ix., p. 104.

Genus ANGITREMA, Haldeman.

Angitrema, Haldeman, Cover of No. 2, Monog. Limniades, Jan. 1841.
Potadoma, Swainson, sp. H. & A. Adams, Genera i., p. 299, 1854.
Glotella, Gray, Zool. Proc., pt. 15, p. 154, 1847.
Io, Lea, (sp.) H. & A. Adams, Genera, i. p. 299, 1854. Chenu, Man. Conchyl. i. p. 290, 1859. Reeve, Monog. Io, April, 1860. Brot, Syst. Cat. Mel., p. 29, 1862.
Lithasia, Haldeman, sp. H. & A. Adams, Genera of Recent Mollusca, i. p. 308, 1854.
Anculotus, Say, (sp.), Jay, Cat. Shells., 4th Edit., p. 276, 1850.
Melania, (sp.) Authos.

A. *Body whorl with a coronal of tubercles.*

1. A. geniculata, Haldeman.
Lithasia geniculata, Haldeman, suppl. to No. 1, Monog. of Limniades, Oct. 1840. Binney, Check List, No. 299.
Anculotus genienlatus, Haldeman, Jay, Cat. Shells, 4th Edit., p. 276. Hanley, Conch. Misc. t. 5, f. 41. Reeve, Monog. Anculotus t. 1, f. 7.
Leptoxis geniculata, Haldeman, Brot, List, p. 24.
Lithasia genicula, Lea, Wheatley, Cat. Shells U. S., p. 28.

2. A. Salebrosa, Conrad.
Melania salebrosa, Conrad, New Fresh Water Shells, p. 51, t. 4, f. 5, 1834. Chenu, Reprint, p. 24, t. 4, f. 13. Dekay, Moll. N. Y., p. 100. Wheatley, Cat. Shells U. S., p. 26. Jay, Cat. 4th Edit., p. 274.
Anculotus salebrosus, Conrad, Reeve, Monog. Anc. t. 1, f. 6, (bad figure.)
Leptoxis salebrosa, Conrad, Brot. List, p. 25.
Lithasia salebrosa, Conrad, Binney, Check List, No. 303.

3. A. subglobosa, Lea.
Lithasia subglobosa, Lea, Proc. Acad. Nat. Sci., p. 55, Feb. 1861. Jour. Acad. Nat. Sci., v. pt. 3, p. 261, t. 35, f. 70. Obs. ix., p. 83.
4. A. Tuomeyi, Lea.
Lithasia Tuomeyi, Lea, Proc. Acad. Nat. Sci., p. 55, Feb. 1861. Jour. Acad. Nat. Sci., v. pt. 3, t. 35, f. 68. Obs. ix., p. 81.
Anculotus Florentianus, Lea, Reeve, Monog. Anc. t. 1, f. 4.

A. *Body whorl encircled above the aperture by two rows of tubercles, of which the inferior one is most prominent.*

5. A. Jayana, Lea.
Melania Jayana, Philos. Proc. ii. p. 83. Philos. Trans. ix., p. 20. Obs. iv., p. 20. Wheatley, Cat. Shells U. S. p. 25. Jay, Cat. Shells, 4th Edit., p. 274. Binney, Check List, No. 154.
Io Jayana, Lea, Brot. List, p. 29.
Melania robulina, Anthony, Bost. Proc. iii., p. 363, Dec. 1850. Binney, Check List, No. 230.
Io robulina, Anthony, Reeve, Monog. Io, species 15.

C. *Body whorl with a central row of tubercles.*

6. A. rota, Reeve.
Io rota, Reeve, Monog. Io, species 13, April, 1860. Brot, List, p. 29.

7. A. armigera, Say.
Melania armigera, Say, Jour. Acad. Nat. Sci., 1st ser., ii. p. 178, Jan. 1821. Binney's Reprint, p. 71. Binney, Check List No. 21. Dekay, Moll. N. Y., p. 93. Jay, Cat. 4th Edit., p. 272. Troost. Cat. Wheatley, Cat. Shells, U. S., p. 24. Catlow, Conch. Nomenc. p. 185. Hanley, Conch. Misc. Melania, t. 7, f, 60.
Io armigera, Say, Reeve, Monog. Io, fig. 11.

8. A. Duttoniana, Lea.
Melania Duttoniana, Lea, Philos. Proc., ii. p. 15. Philos. Trans., viii. p. 189, t. 6, f. 54. Obs. iii., p. 26. Catlow, Conch. Nomenc. p. 186. Binney, Check List, No. 92. Jay, Cat. 4th Edit., p. 273.
Io Duttoniana, Lea, Reeve, Monog. Io, fig. 9. Brot. List, p. 29.
Io fasciolata, Reeve, Monog. Io, fig. 14.

9. A. stygia, Say.
Melania stygia, Say, New Harmony Dissem., p. 261, Aug. 28, 1829. Reprint, p. 17. Binney's Reprint, p. 142. Binney, Check List, No. 251. Wheatley, Cat. Shells U. S., p. 27. Jay, Cat. 4th Edit., p. 275. Dekay, Moll. N. Y., p. 93, Reeve, Monog. Mel. sp. 400. Brot. List, p. 40.
Melania tuberculata, Lea, Philos. Trans. iv., p. 101 t. 15, f. 31. Obs. i., p. 111. Dekay, Moll. N. Y., p. 93. Wheatley, Cat. Shells. U. S., p. 27. Binney, Check List, No. 277. Jay, Cat., 4th Edit., p. 275. Catlow, Conch. Nomenc, p. 189.
Juga tuberculata, Lea, Chenu, Man. Conchyl. i. f. 2017.
Melania Spixiana, Lea, Philos. Trans. vi. p. 93. Obs., v. p. 93.
Melania nodata, Reeve, Monog. Mel. fig. 422.

10. A. funiculata, Reeve.
Io funiculata, Reeve, Monog. Io, t. 2, f. 8. April, 1860. Brot, List, p. 29.

11. A. lima, Conrad.
Melania lima, Conrad, New Fresh Water Shells, p. 54, t. 8, f. 8, 1834. Chenu, Reprint. Dekay, Moll., N. Y. p. 97. Wheatley, Cat. Shells U. S., p. 26. Jay, Cat. 4th Edit., p. 274. Catlow, Conch. Nomenc. p. 187. Brot, List, p. 33.
Anculotus lima, Conrad, Reeve, Monog. Anc. t. 1, f. 1.
Lithasia lima, Conrad, Binney, Check List, No. 300.

12. A. verrucosa, Rafinesque.
Pleurocera verrucosa, Rafinesque, Annals of Nature, p. 11, 1820.
Melania nupera, Say, New Harmony Dissem. p. 260. Amer. Conch. Pt. 1. t. 8, f. 1, 2. Binney's Reprint, p. 157, t. 8. Chenu's Reprint p. 16. t. 2, f. 3. Dekay, Moll. N. Y. p. 97. Wheatley, Cat. Shells. U. S. p. 26. Brot. List, p. 40. Jay, Cat. Shells, 4th Edit. p. 274.

[Nov.

Anculotus nuperus, Say, Reeve, Monog. Anc. t. 1, f. 5.
Lithasia nupera, Say, Binney, Check List, No. 302.
Melanopsis semigranulosa, Deshayes, Encyc. Meth. Vers. ii. p. 438. Lamarck, Anim. Sans. Vert. 2d edit. vii. p. 491.

Sub-genus LITHASIA, Haldeman.

Lithasia, Haldeman, Supp. to Monog. Limniades, No. 1, Oct. 1840. Binney, Check List, Feb. 1860. Lea, Proc. Acad. Nat. Sciences, p. 54, Feb., 1861. Lea, Jour. Acad. Nat. Sci. v, p. 258 and 354, Mar. 1863. Observations ix. p. 80 and 176.
Lithasia, Haldeman, (part.), H. & A. Adams, Genera 1, p. 308, Feb. 1854.
Lithasia, Lea, 1845, Chenu, Man. Conchyl. i. p. 296, 1859.
Megara (*part.*) Adams, Genera, i. p. 306, Feb. 1854.
Anculotus (*part.*) Say, Gray, Genera, Zool. Proc. pt. 15, p. 153, 1847. Reeve, Monog. Ancul., Apr., 1860.
Anculosa and *Melania* (Sp.) Auct.

SPECIES.

A. *Shell large, oval, inflated.*

1. L. fuliginosa, Lea.
Melania fuliginosa, Lea, Philos. Proc. Philos. Trans. viii. p. 170, t. 5, f. 17. Obs. iii. p. 8. DeKay Moll. N. Y., p. 94. Troost, Cat. Wheatley, Cat. Shells, U. S. p. 25. Binney, Check List, No. 113. Catlow, Conch. Nomenc., p. 186. Brot. List, p. 40. Reeve, Monog. Melania, sp. 401.

2. L. Florentiana, Lea.
Melania Florentiana, Lea, Philos. Proc. Philos. Trans. viii. p. 188, t. 6, f. 53. Obs. iii. p. 26. DeKay, Moll. N. Y., p. 99. Wheatley, Cat. Shells U. S., p. 25. Binney, Check List, No. 110. Catlow, Conch. Nomenc., p. 186. Brot. List, p. 40.

3. L. venusta, * Lea.
Melania venusta, Lea, Philos. Proc. Philos. Trans. viii. p. 187, t. 6, f. 52. Obs., iii. p. 25. DeKay, Moll. N. Y., p. 99. Jay, Cat. 4th Edit. p. 275. Troost, Cat. Wheatley, Cat. Shells U. S., p. 27. Binney, Check List, No. 285. Catlow, Conch. Nomenc. p. 189. Brot. List, p. 40. Reeve, Monog. Mel., sp. 315.

4. L. dilatata, Lea.
Lithasia dilatata, Lea, Proc. A. N., S. p. 55, 1861. Jour. A. N. S., v. pt. 3, p. 260, t. 35, f. 69. Obs. ix. p. 82.

5. L. imperialis, Lea.
Lithasia imperialis, Lea, Proc. A. N. S., p. 55, 1861. Jour. A. N. S., v. pt. 3, p. 258, t. 35, f. 67. Obs. ix. p. 80.

B. *Shell small, compact oval-elliptical.*

6. L. vitatta, Lea.
Lithasia vittata, Lea, Proc. A. N. S., p. 273, 1862. Jour. A. N. S., v. pt. 3, p. 354, t. 35, f. 67. Obs. ix. p. 176.

7. L. Showalterii, † Lea.
Lithasia Showalterii, Lea, Proc. A. N. S., p. 188, 1850. Jour. A. N. S., v. pt. 3, p. 262, t. 35, f. 72. Obs. ix. p. 84.
Melania Showalterii, Lea, Reeve, Monog. sp. 423. Brot, List. p. 33.

* More cylindrical, lighter colored, and more ponderous, though not so large as *L. Florentiana*.
† More cylindrical than *vittata*, with the aperture wider, lip more curved, and the spine shorter and more rapidly accuminate.

8. L. nuclea, Lea.
Lithasia nuclea, Lea, Proc. A. N. S., p. 188, 1860. Jour. A. N. S., v. pt. 3, p. 263, t. 35, f. 73. Obs. ix. p. 85. Binney, Check List, No. 301.
Melania nuclea, Lea, Reeve, Monog., sp. 423. Brot. List., p. 33.

9. L. nucleola, Anthony.
Melania nucleola, Anthony, Proc. Boston, Soc. N. H. iii. p. 360, Dec. 1850. Binney, Check List, No. 181. Brot, List, p. 40. Reeve, Monog. sp. 348.

10. L. undosa, Anthony,
Melania undosa, Anthony, Ann. N. Y. Lyc., vi. p. 124, t. 3, f. 25, Mar. 1854. Binney, Check List, No. 280. Brot. List p. 39. Reeve, Monog. Mel. sp. 447.
Melania varinodosa, Anthony, MSS. Reeve, Monog. sp. 268. Brot. List, p. 39.

11. L. obovata, Say.
Melania obovata, Say, New Harmony Dissem. No. 18, p. 276, Sept. 9, 1829. Reprint, p. 18, 1840. Binney's Reprint, p. 143. DeKay, Moll. N. Y. p. 98. Wheatley, Cat. Shells U. S., p. 26. Catlow, Conch. Nomenc. p. 188. Jay, Cat., 2d Edit. p. 45.
Anculotus obovatus, Say, Jay, Cat. 4th Edit., page 276. Reeve, Monog. Mel. fig. 21.

Leptoxis obovata, Say, Hald. Monog. Lept. p. 2, t. 1. f. 27—34. Binney, Check List, No. 374. Brot. List p. 25.
Lithasia obovata, Say, Chenu, Manuel i. f. 2056—8.
Anculosa obovata, Say, Wheatley, Cat. Shells U. S., p. 26.
Melania Hildrethiana,* Lea, Philos. Proc. Philos. Trans. viii. p. 164, t. 5, f. 1. Obs. iii. p. 2, t. 5, f. 1. DeKay, Moll. N. Y., p. 92. Wheatley, Cat. Shells U. S., p. 25. Binney, Check List, No. 138. Catlow, Conch. Nomenc. p. 187.

12. L. consanguinea, Anthony.
Melania consanguinea, Anthony, Ann. N. Y. Lyc. vi. p. 125, t. 3, f. 26, Mar. 1854. Binney, Check List, No. 66. Brot. List, p. 39.
Anculotus consanguineus, Anthony, Reeve, Monog. Anc. sp. 2.

C. *Shell obliquely flattened.*

Melania compacta, Anthony, Ann. N. Y. Lyc., vi. p. 122, t. 3, f. 22, Mar. 1854. Binney, Check List, No. 62. Brot, List, p. 32. Reeve, Monog. sp. 343.

14. L. obliqua, Anthony, MSS.

D. *Shell sub-cylindrical.*

15. L. brevis, Lea.
Melania brevis, Lea, Philos. Proc. ii. p. 242. Philos. Trans. ix. p. 26. Obs. iv. p. 26. Wheatley, Cat. Shells U. S. p. 24. Binney, Check List, No. 38. Brot, List, p. 32. Reeve, Monog. sp. 344.
Anculosa solida, Lea, Phil. Proc. ii. p. 243. Philos. Trans. ix. p. 29, t. 9, f. 29. Obs. iv. p. 29. Wheatley, Cat. Shells U. S. p. 28.
Leptoxis solida, Lea, Binney, Check List, No. 384. Brot, List, p. 25.
Milania trivittata, Reeve, Monog. sp. 420.

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* Young Shell.

16. L. fusiformis, Lea.
Lithasia fusiformis, Lea, Proc. A. N. S. p. 54, 1861. Jour. A. N. S., v. pt. 3. p. 261, t. 35, f. 71. Obs. ix. p. 71.

17. L. Downiei, Lea.
Lithasia Downiei, Lea, Proc. A. N. S., p. 273, 1862. Jour. A. N. S., v. pt. 3, p. 354, t. 39, f. 227. Obs. ix. p. 176.

Sub-Genus STREPHOBASIS, Lea.

Strephobasis, Lea, Proc. Acad. Nat. Sci. p. 96, Apr. 1861. Jour. A. N. S., v. pt. 3, p. 264 and 355. Obs. ix. p. 86, 177.
Megara, (sp.) H. & A. Adams, Genera i. p. 306, Feb. 1854.

A. *Shell ovate-conical.*

1. Strephobasis curta, Haldeman.
Melania curta, Haldeman, Monog. Limniades, No. 3, p. 3 of Cover. Binney Check List, No. 80. Brot. List, p. 32. Reeve, Monog. sp. 345.
Melania solida, Lea, Philos. Proc. iv. p. 9, f. 27. Obs. iv. p. 57. Binney, Check List, No. 245. Brot, List, p. 31. Reeve, Monog. Melania, f. 454.
Strepholasis solida, Lea, Jour. A. N. S., v. pt. 3, p. 266, t. 35, f. 77. Obs. ix. p. 88.

2. Strephobasis, pumila, Lea.
Melania pumila, Lea, Philos. Proc. iv. p. 166, Aug. 1845. Philos. Trans. x. p. 60, t. 9, f. 36. Obs. iv. p. 60. Binney, Check List, No. 223. Brot. List. p. 33. Reeve, Monog. sp. 446.

3. Strepho. carinata, Lea.
Strephobasis carinata, Lea, Proc. A. N. S. p. 273, 1862. Jour. A. N. S., v. pt. 3, p. 355, t. 39, f. 228. Obs. ix. p. 177.

B. *Shell cylindrical.*

4. Strepho. olivaria, Lea.
Strephobasis olivaria, Lea, Proc. A. N. S., p. 273, 1862. Jour. A. N. S., v. pt. 3, p. 356, t. 39, f. 229. Obs. ix. p. 178.

5. Strepho. plena, Anthony.
Melania plena, Anthony, Ann. Lyc. N. H. New York, vi. p. 121, t. 3, f. 21, Mar. 1854. Binney, Check List, No. 210. Brot, List, p. 33. Reeve, Monog. Mel. sp. 450.
Strephobasis Spillmanii, Lea, Proc. A. N. S., p. 96, 1861 Jour. A. N. S. v. pt. 3, p. 264, t. 35, f. 74. Obs. ix. p. 86.

6. Strepho. cornea, Lea.
Strephobasis cornea, Lea, Proc. A. N. S., p. 96, 1861. Jour. A. N. S., v. pt. 3, p. 265, t. 35, f. 75 Obs. ix. p. 87.

7. Strepho. corpulenta, Anthony.
Melania corpulenta, Anthony, Ann. Lyc. N. H., vi. p. 127, t. 3, f. 28, Mar. 1854. Binney, Check List, No. 70. Brot. List, p. 32.

8. Strepho. bitæniata, Conr.
Melania bitæniata, Conrad, New Fresh Water Shells, p. 52, t. 8, f. 6, 1834. DeKay, Moll. N. Y., p. 94. Wheatley, Cat. Shells U. S., p. 24. Binney, Check List, No. 34. Brot. List, p. 32. Hanley, Conch. Misc. t. 8, f. 73.
Anculotus bitæniatus, Conrad, Reeve, Monog. Anculotus t. 3, f. 25.
Strephobasis Clarkii, Lea, Proc. A. N. S., p. 66, 1861. Jour. A. N. S., v. pt. 3, p. 265, t. 35, f. 76. Obs. ix. p. 87.

Notes on the PICIDÆ.

BY JOHN CASSIN.

(Continued from page 204.)

33. Campephilus Bairdii, Nobis.

Much resembling *C. principalis*, but smaller and with the black anterior feathers of the crest, longer than those succeeding, which are scarlet. White longitudinal line on the neck reaching quite to the base of the bill. In *C. principalis* the scarlet plumes of the crest are the longer, and the line on the neck does not extend to the base of the bill, both of which characters are very accurately shown in Audubon's plates, B. of Am. pl. 66, and Oct. ed. iv. pl. 256. Colors of all other parts in the present bird are the same as those of *C. principalis*.

Total length, about 18½ inches, wing 9¼, tail 6¾ inches.

Hab.—Cuba. Spec. in Nat. Mus., Washington, from Mr. Charles Wright, and Mus. Acad., Philadelphia, from Mr. R. C. Taylor.

Mr. Wright who is now making zoological and botanical collections in Cuba, under the auspices of the Smithsonian Institution, has obtained two specimens only of this bird, both of which are labelled "Monte Verde, Cuba, —Iris yellow." It appears to be one of the singular insular species which have become well known to naturalists, and is in all respects, except size and the other characters above designated, quite like *C. principalis*. Specimens in the Acad. Mus. were presented by Mr. Richard C. Taylor, in a very interesting collection made in the Northern part of the Island, and are precisely similar to those of Mr. Wright in all particulars, showing unmistakeably the constancy of the characters and points of difference from *C. principalis*.

I have much pleasure in dedicating this bird to Professor Baird, of the Smithsonian Institution, who first directed my attention to it as a probably distinct species.

34. Campephilus Sclateri, (Malherbe.)

Judging from a single specimen recently received from Mr. Fraser's collection, I much suspect that this bird is the young male of *B. guatemalensis*, (Hartlaub.) Five specimens of the latter are in the Acad. Mus., several of which have traces of the lead color at the base of the bill, which color is given as that of the bill in *C. Sclateri* and they have, moreover, every other character except the black throat. Two specimens have traces of the transverse bands on the back, as given in M. Malherbe's plate of that species.

35. Dendropicus africanus, (Gray.)

Picus africanus, Gray, Zool. Misc. p. 18, (1831.)

Two specimens, which I regard as male and female, of the species described by Mr. Gray, as above cited, are in the Acad. Mus., and were received in Mr. Duchaillu's collections from Cape Lopez and the River Camma, Western Africa. The female is in adult plumage, but the male has a few yellow feathers only on the crown and occiput, instead of the red occipital stripe described by Mr. Gray, which would denote maturity. This bird belongs to the same group as *Picus biarmicus*, Cuv., LeVaill. Ois. d'Afr. pl. 251. 252 and bears a general resemblance, in colors, to that species, but the tail is clear brownish-black, and the back is plain dark olive without spots.

Female, adult. Head above clear brownish-black, stripe through the eye and another from base of lower mandible and throat silky white. Upper parts of body and wings brownish-olive, with some obscure, transverse bars or spots of greenish-white on outer webs of shorter quills, and a few white spots on wing coverts. Quills brownish-black, with about four spots of white on their outer webs, and large white spots on their inner webs. Under parts dark olive, with numerous circular and transversely oblong spots of white, disposed to form bars on the flanks and under tail coverts. Tail brown-

ish-black. Bill and feet lead or horn color; edge of upper and terminal half of under mandible very pale, nearly white. Total length (of skin,) about $8\frac{1}{4}$ inches, wing $4\frac{1}{4}$, tail $3\frac{1}{4}$ inches.

Male, young? Very similar to the female, but rather larger and with a few feathers on the top of the head, yellow and with the rump strongly tinged with greenish yellow. Total length (of skin,) $8\frac{3}{4}$ inches, wing $4\frac{1}{2}$, tail $3\frac{1}{4}$ inches.

Hab.—Cape Lopez and River Camma, Western Africa. Spec. in Mus. Acad., Philada.

36. Celeus flavescens, (Gmelin.)

This well known but apparently very variable species, it is quite discouraging to encounter with one's perceptive ability somewhat sharpened by keeping a careful lookout for the nicely adjusted characters of the species, in some other groups. Here can be found, not only difference in size, but colors in an assortment of shades and variety.

With about twenty-five specimens before me, I am not a little perplexed, and find it difficult to believe that they are really only one species, but even with that large number of specimens, I do not deem it expedient to attempt a separation. They seem to admit of division into three groups, as follows:

1. The bird figured by M. Malherbe, (pl. 53, fig. 1, 2,) with clear black and pale yellowish-white plumage. Five specimens in the Academy Museum are from Guiana, and were presented by Dr. C. Hering, of this city, who obtained them in that country. This bird seems to be the true *P. flavescens* of Gmelin, who merely gives a name to the species figured in Brown's Ill. pl. 12, and it is the largest variety. Dr. Hering's specimens are fully $1\frac{1}{2}$ inches longer than M. Malherbe's male, (fig. 1,) and the wing measures $6\frac{1}{2}$ inches.

2. The yellowest variety, specimens of which, in the Academy Museum, were brought from the Island of Trinidad by Mr. A. F. Darley. This is about the size of M. Malherbe's figures, and is very probably the same as fig. 3, 4. Specimens are mature, and clear black, but the head, crest, rump, under wing coverts and dorsal bands, deep ochre-yellow, brightest on the rump. Wing measures $5\frac{3}{4}$ inches. Other specimens from Southern Brazil most nearly resemble this variety.

3. The smallest variety, characterized by black and a much darker ochraceous or dull orange plumage, in some specimens with the orange color approaching a bay or chestnut shade. The dorsal bands are narrower, and the bird is smaller than the preceding varieties, though the wing measures about $5\frac{3}{4}$ inches. This variety I regard as possibly a distinct species. The locality is not given in any specimen of this variety in the Academy Museum, nor have I other means of information in this particular.

37. Celeus lugubris, (Malherbe.)

This is another variable species, of which specimens are in a very fine collection made by Capt. T. J. Page, U. S. Navy, during his expedition to the River La Plata, and which is now in the National Museum. Specimens vary in the shade of the brownish-black of the upper parts, and also in the width of the transverse yellowish-white bands of the back; one specimen having only arrow-heads, and very narrow tips of that color. Apparently this species can be easily recognised by the chestnut-colored spots and transverse bands on the quills.

38. Celeus exalbidus, (Gmelin.)

Another of the same kind. Of this apparently abundant species, specimens vary in almost as great a degree as in domestic fowls. The species, however, can be always recognized without hesitation, though one specimen may have the entire wing brownish-black, and another the same part light-chestnut! These are about the extremes, but intermediate specimens of various varieties of color are of more common occurrence.

39. Celeus cinnamomeus, (Linnæus.)

Beautiful and very accurate figures of the male and female of this species are given by M. Malherbe, (pl. 56.) Specimens of the young of both sexes are in the Academy Museum, and differ from the adult in the darker color of the crest. In that of the male the color may be said to be a lighter shade of the same cinnamon color of the other plumage, though evidently changing to the dull, yellowish-white of the adult. Vieillot, pl. 111, Ois. d'Am. Sept., seems to represent the young male.

40. Celeus mentalis, Cassin.

Celeus mentalis, Cass. Proc. Acad. Philada., 1860, p. 13. Jour. Acad. Philada., v. pl. 52. fig. 2, 3.

This species, and my description of it above cited, were unknown to M. Malherbe. Specimens of both sexes are in a collection made during a survey of the River Atrato in New Grenada, by Lieut. Michler, U. S. Top. Engineers, now in the National Museum, and are represented in the plate of the Journal of the Academy, above cited.

41. Mesopicus goertan, (Gmelin.)

Picus goertan, Gmelin, is a name given to the bird figured in Buff. pl. Enl. 320. This bird is in nearly every collection from the Gambia or Senegal country, and is now a well known African species, presenting some variations of plumage, but is not difficult to distinguish. Generally, specimens have the middle of the abdomen yellow, of darker or lighter shade, but occasionally the same part is crimson, in which plumage it is *Dendrobates poicephalus*, Swainson, and may be the adult bird.

Specimens from Fazogloa, Eastern Africa, do not differ materially from those from Gambia. It is an error to regard *Dendrobates spodocephalus*, Bonaparte, (*D. poicephalus* Rüppel, nec Swainson,) as identical with this species.

42. Mesopicus spodocephalus, (Bonaparte.)

"*Dendrobates poiccphalus*, Swains." Rüpp. Syst. Uebers, p. 86, pl. 34.

This is an entirely respectable species. Though of similar general appearance and distribution of colors, this bird is certainly different from the preceding and resembles, in a greater degree, *Mesopicus capensis*, (Gmelin.) The head and under parts of the body are clear lead color, much darker than in *M. goertan*, the tail is clearer brownish-black, the scarlet space on the abdomen larger, and in other respects it is clearly distinct and easily distinguished on comparison of specimens.

This bird is accurately figured by M. Rüppell, as above cited. One specimen in the Acad. Mus. is stated to be from M. Rüppell's collection in Abyssinia.

43. Mesopicus griseocephalus, (Boddaert.)

Picus capensis, Gmelin.

Very accurate and handsome figures of the male and female of this species are given by M. Malherbe, (pl. 62, fig. 7, 8, 9,) and it presents much uniformity of colors in adult .plumage. The young female of this species is *Dendrobates immaculatus*, Swainson. The young male is as follows:

Young ♂. Crown and rump scarlet, with a cupreous tinge; upper parts of body dull olive green, much less yellow than in the adult. Head (except crown) and under parts dull greenish cinereous, tinged with reddish-brown on the sides. The young birds of this species in the Acad. Mus. are from the collection of that excellent ornithologist, M. Jules Verreaux, of Paris.

44. Mesopicus immaculatus, (Swainson.)

Dendrobates immaculatus, Swains., B. of W. Afr. 11, p. 152, (1837.)

As stated above, this bird is the young female of the preceding, and in my opinion, can be recognised as such on comparison of the description of Swainson with a female specimen, or with a figure of the female.

45. Dendropicus squamosus. (Vieillot.)
Picus adspersus, Natterer.
Picus spilogaster, Wagler, Syst. Ad. No. 59, (1827.)
Adults of both sexes are given in the beautiful plate of M. Malherbe, (pl. 60.) The young male in the Acad. Mus. from the Massena collection, is labelled "*Picus spilogaster*, Wagler," in a hand-writiug that I do not recognize. It differs only from the adult male in having the top of the head clear coppery red, and the under parts of the body with the grecnish-brown much predominating and somewhat disposed to form longitudinal stripes, the white spots aud bands being less clearly defined. It seems to be the bird described by Wagler, as above.

46. Chrysocolaptes sultaneus, (Hodgson.)
Of this fine species there is not a sufficient uumber of specimens in the Acad. Mus. to warrant any conclusion on the specific differences between it and *C. DeLessertii*, (Malherbe.) There is, however, oue very handsome male, which appears to be the latter, and my opinion, at present, is that the two names are synonymous.

47. Chrysocolaptes punctigollis, Malherbe.
Several specimens of this species are in the Acad. Mus., and generally are quite similar to M. Malherbe's plate and description, but differ amongst themselves in some particulars. Two specimens from Capt. Boys' India collection have the spots on the breast triaugular and cordate, while the female (of the same specimens,) has the front and throat nearly pure black, with but few miuute spots. Two other specimeus, from the Massena collection, have the breast with spots tending to form longitudinal stripes, like *C. bengalensis*.

48. Gecinus vittatus, (Vieillot.)
Picus dimidiatus, Temminck.
Picus viridanus, Blyth ?
Seven specimens in the Acad. Mus., all of which appear to be from the Malay Archipelago, are precisely as described by Malherbe and Temminck. In all of these the plumage of the under parts of the body is characterized by every feather having a narrow lougitudinal stripe on each side (or submarginal), uniting at the tip, but with *no medial line* on the shaft of the feather, and adults and young are alike in this respect.
Two specimens from Siam in the Acad. Mus. are like the preceding, but differ in having the under plumage with *medial lines* on every feather *strongly defined*, quite as much so as in *G. striolatus* (Blyth). These are the only specimens in the Museum which are certainly from continental Asia, and are exactly as iu the description by Mr. Blyth of *Picus viridanus* in Jour. As. Soc. Bengal, xii. p. 1000. He states, as a character, a "narrow medial line upon the shaft," which, as above statcd, does not appear in Javanese specimens. In addition, the black superciliary band and black *moustache* in Mr. Blyth's species are much more clearly marked. Though nearly allied, my impression is that these two birds may be regarded properly as distinct species, as they are given by Messrs. Horsfield and Moore, in Catalogue of Birds in the East India Company's Museum (ii. p. 660).

49. Gecinus viridanus, Blyth.
As stated in the preceding article, two specimens from Siam are precisely this species as described by Mr. Blyth, and are, very probably, distinct from *G. vittatus*.

50. Gecinus xanthoderus, (Malherbe.)
This bird, though bearing some resemblance to the young of *G. chlorolophus* (Vieillot), is quite distinct, and, so far as I can see, a perfectly valid species. It is given as identical with that species by Messrs. Horsfield and

Moore, in their Catalogue of Birds in the Museum of the East India Company, but, in my opinion, erroneously. Specimens are in the Academy Museum.

51. Gecinus chlorolophus, (Vieillot.)

♀ young. Throat and neck before white, irregularly spotted with dull brown, the latter predominating on the neck; abdomen dull white with transverse bands of greenish brown; under tail coverts greenish brown with large spots or imperfect bands of white. Upper parts green, quills and tail feathers brownish black, secondaries with a portion of their outer webs golden or orange yellow. In *G. xanthoderus*, this reddish orange color extends to all the secondary and tertiary quills and to the wing coverts, and the under parts are brownish green with large spots of white on the sides. Both *G. chlorolophus* and *xanthedorus* are very handsomely and accurately figured by M. Malherbe (pl. 74, 75).

52. Gecinus miniatus, (Forster.)

♀ young. Like the adult, but with the throat and breast in front darker and with numerous white points on the throat. Abdomen dull white with transverse dull brownish black bands, wider and more irregular than in adult. Back dull greenish brown with a few light green feathers.

A specimen from Siam, which seems to be adult, has very minute white spots on the cheeks, and the brownish black transverse bands on the abdomen rather wider than in specimens from the Malay Archipelago. Siam seems to be an unusual locality, but is undoubtedly correct.

53. Chrysopicus callopterus, (Lawrence.)

Chloronerpes callopterus, Lawr., Annals, Lyc. N. Y.

This curious little Woodpecker from Panama, recently described by Mr. Lawrence of New York, belongs to the same group as *Picus chrysochlorus*, Vieillot, *P. erythropsis*, Vieillot, *P. chlorocephalus*, Gmelin, *P. aurulentus*, Temminck, and others, all of which are included in his genus *Chloropicus* by M. Malherbe. It most nearly resembles *C. leucolæmus*, Malh., Mon. pl. 85, but is smaller, and otherwise apparently quite distinct. The type specimens now in my possession, through the kindness of Mr. Lawrence, seem to be scarcely adult; the male, very probably in adult plumage, has the head above scarlet, though in the specimen that color is nearly restricted to an occipital band.

This species is not strictly included in the group *Chloronerpes*, as defined by Mr. Swainson. Of the relations of this bird to *C. leucolæmus*, Malh., I can only judge from Malherbe's figure of the latter, having no specimen.

54. Campethera gabonensis, (Verreaux.)

This little bird in young plumage can scarcely be recognized as this species, and it is not surprising that it has been regarded as distinct from the adult. The under parts in some specimens are nearly uniform dark brown with a very slight tinge of green, the edges of the feathers only being dull white. One specimen in this plumage in the Acad. Mus. is a young male. Other young birds have the under parts with longitudinal wide bands of dark yellowish green, the margins of the feathers conspicuously edged with greenish yellow. Adults of both sexes are very correctly given by M. Malherbe (pl. 91, fig. 1, 2).

55. Campethera Caroli, (Malherbe.)

The adult male of this species is given by M. Malherbe with his usual excellence. The young male is as follows:

♂ young. Similar to the adult, but with the rufous mark on the ear much larger, and with the throat and breast strongly tinged with rufous. White spots on the under parts and especially on the abdomen, larger than in the adult. The female is not in the Academy Museum. In his notes in my pos-

session, Mr. Duchaillu states this species to have been rarely seen on the Muni and Moonda rivers, but he found it more abundant at Cape Lopez, and on the River Camma.

56. Campethera chrysura, var. *lineata*, nobis.

Several specimens of *C. chrysura* (Swainson), from western and southern Africa are very nearly as given by M. Malherbe, but one specimen from Port Natal is different in having well defined longitudinal lines on the upper parts, instead of the irregular transverse bands usually seen. The black stripes on the under parts seem to be wider, but in other respects it presents no further difference. Other specimens seem to present intermediate characters between the Natal bird here alluded to and others from the same and other localities. My conjecture is that this specimen is the fully mature bird. If this specimen only was compared with a specimen as figured by M. Malherbe, it would scarcely be regarded as the same species by any naturalist.

57. Campethera puctiligera, (Wagler.)

There is quite considerable diversity in the markings of the upper parts in this species, but they are generally, however, as given by M. Malherbe, with the light spots not so large. There is in some specimens a tendency in these spots to form longitudinal lines, and one female specimen has on the back well-defined crescent-shaped bands on every feather. It may be that these are nearly allied species confounded.

Young ♂? Head above black without spots, occipital feathers light scarlet, under parts of body with black spots larger than in adult, and forming irregular transverse bands on the flanks.

58. Melanerpes torquatus, (Wilson.)

Wilson's figure of the male of this species remains the most correct. Audubon's figure of the male, which is copied by M. Malherbe, is greatly exaggerated, no specimen having the light yellowish or fawn-colored breast with black spots as represented, except that it may be a faded, worn, or immature character, and all specimens have the *tibiæ* lustrous black. The sexes are very nearly alike, but the male appears to present the red of the front and cheeks rather more extended, and generally including the eye. I have never seen a specimen like M. Malherbe's figure, stated to be the female, (pl. 96, fig. 2), nor in fact entirely like fig. 4 of the same plate. Very fine specimens, with the sexes carefully stated, were sent from Fort Tejon, California, to the Smithsonian Institution by Mr. John Xantus, and numerous others have been collected and the sexes carefully ascertained. It appears to be one of the most common birds of Western North America. Twenty-four specimens are now before me, the greater part of which are duplicates belonging to the Academy, and kept for exchange. This species is a very distinct subgeneric type. M. Malherbe's plate of this species is one of the very few of his great work that I cannot understand.

59. Melanerpes portoricencis, (Daudin,) Mal. Mon., pl. 97, fig. 5, 6.

M. Malherbe's figure does not represent the mature bird of this species, in which all the upper parts are clear black with a green lustre, and with very fine, but readily seen, transverse lines of deeper black. On the neck the black of the upper parts and the red of the under parts come together abruptly, without any such intermediate brown or paler color, as represented in the plate. The white edge of the wing seems to be an immature character.

Young ♀. Under parts dull brown, darker on the throat and lighter on the flanks, scarlet feathers appearing on the breast and middle of the abdomen and at the base of the under mandible. Quills and tail brownish black. Forehead and rump white, other upper parts black with a bluish green lustre, shorter quills edged with white.

This species is singularly similar in form to the common *Melanerpes erythrocephalus* of North America, and is, of course, strictly congeneric.

60. Melanerpes formicivorus, (Swainson.)

In my volume, published some years since, "Birds of California, Texas, &c.," I expressed some suspicion of the identity of this species and *M. flavigula*, Malherbe. My opinion still is that the latter is the young or a seasonal plumage of the former, but as I can only express an opinion, without having the means of satisfactory conclusion, I shall give them as distinct in my catalogue of the *Picidæ* in the Academy Museum.

With about twenty specimens before me from various localities, I cannot separate clearly, according to characters yet given, the two species or supposed species here mentioned; a few specimens from California and Oregon being, however, clearly *M. formicivorus*, and two specimens of unknown locality, but with the heads above black, without scarlet, being clearly females of *M. flavigula*, as defined by M. Malherbe. One of them has a few red feathers on the breast and the other has a fairly marked black transverse band on the same part, but much narrower than in specimens of *M. formicivorus* from California. The difficulty is with male specimens having the top of the head scarlet, exactly as in the male *M. formicivorus*, but otherwise much resembling the two female specimens alluded to, and also M. Malherbe's plate of *M. flavigula* (pl. 99, fig. 5, 6). Of these there are several in the Acad. Mus. without indication of locality. They are apparently in adult plumage, and rather smaller than California specimens. Although, as I have said above, I suspect that *M. flavigula* is identical with *M. formicivorus*, yet I think it possible that a species might be established on the smaller specimens alluded to, much like *M. formicivorus*, but smaller, with the pectoral transverse band narrower, and different in some other minor particulars. I regard it as possible also that these smaller male specimens are really adult males of *M. flavigula*, and that in adult plumage both male and female of that species are more like *M. formicivorus* than is stated at present, though smaller and possibly distinct specifically.

M. formicivorus, ♂ young, (in Mr. Bell's collection from California, now in Acad. Mus.) Entire upper parts black, with a greenish lustre, except the rump, which is white. Head above black with a few scarlet feathers, front and throat black, a wide subfrontal band and large space on the neck before pale yellow. Breast without black band, but with numerous oblong and irregular white spots on a ground of brownish black, abdomen white, with longitudinal stripes of brownish black. Quills brownish black, several of the primaries having large spots of white on their inner webs; tail brownish black, all the shorter feathers tipped with white. Bill light brownish, the under mandible almost entirely yellowish white.

Specimens from Lower California, in Mr. Xantus' collection, have the yellowish white frontal band narrower than in those from other localities.

61. Melanerpes rubrifrons, (Spix.)

Young ♂. Like the adult, but with the throat having some white feathers with small black spots; abdomen and under tail coverts dull white with small, obscure, somewhat saggitate spots of brownish black, and a narrow medial portion yellowish scarlet. Entire upper parts brownish black, the shortest quills with conspicuous white spots on their inner webs. Quills brownish black, narrowly edged with white on their outer webs. Tail black, the two outer feathers narrowly tipped with white. Head above with a few yellowish scarlet feathers.

(To be continued.)

Description of the Genus STEREOLEPIS Ayres.

BY THEODORE GILL.

Genus STEREOLEPIS Ayres.

Synonymy.

= Stereolepis *Ayres*, Proc. California Acad. of Nat. Sci., vol. ii. p. 28, 1858.
Centropristis sp. *Owen.*
Oligorus sp. *Günther.*

Body oblong, highest at or behind the ventral fins, thence above rapidly declining to the caudal fin with the vent posterior and the caudal peduncle narrowed to the base of the fin.

Scales rather small, mostly in very oblique rows, obliquely quadrangular and as high as or higher than long, with the nucleus more or less behind the centre, with concentric striæ and folds, and radiating linear grooves diverging from the nucleus towards the middle third of the anterior margin; the posterior margin unarmed and bordered by a membranous extension.

Lateral line scarcely impressed, parallel with the back.

Head nearly or quite as high as long, with the profile nearly straight and rapidly declining from the nape to the snout; the forehead broad and transversely convex. Scales on cheeks and opercula similar to those of the body; on the crown and middle of forehead between the eyes small and imbedded in the skin. Snout, preorbitals and jaws naked. Eyes entirely in the anterior half of the head, small and subcircular. Nostrils double, simple nearly central between the snout and eye, and closely approximated. Preoperculum rectangular, produced backwards towards its angle, which is itself subangulated, slightly crenulated below its angle, entire above. Operculum unarmed, neither spinous nor with a developed internal ridge. Suboperculum behind the operculum below the angle of the latter, rounded behind and above.

Mouth rather large, with the cleft oblique, the supramaxillary continued to or below the eye. Jaws nearly even in front, lower shortest; intermaxillaries nearly as long as supramaxillary, attenuated backwards; the supramaxillary widened backwards, obliquely truncated at the end and with a supplementary piece above near the end.

Teeth on the jaws densely villiform, in a broad band interrupted at the symphysis and attenuated backwards. Vomer and palatine bones with villiform teeth.

Branchiostegal rays seven.

Dorsal fin nearly double; the spinous portion longer than the soft and longer than the head, with nine spines, very low, convex above, the third spine being longest; the posterior portion with two spines and the soft part nearly oblong, angulated before and behind, highest in front. Anal fin similar to the second dorsal, but inserted further behind, its anterior portion being under the posterior part of the latter.

Caudal fin wide, subtruncated or emarginated behind.

Pectoral fins angulated at its upper angle and with the posterior margin obliquely convex.

Ventral fins inserted below or behind the pectoral fins, of moderate size, with the first ray longest.

Type Stereolepis gigas, *Ayres.*

Stereolepis is most closely related to the genus *Oligorus* of Günther, and, indeed the differences between the two are not obvious from the data at hand. It is quite possible that the *Oligorus gigas*, at least, belongs to *Stereolepis.* The type of *Stereolepis gigas* Ayres is in the museum of the Academy of Natural Sciences of Philadelphia, to which it was presented by Mr. Geo. Davidson. Its weight was originally 360 pounds.

STEREOLEPIS GIGAS, Ayres.

Hab. California.

If the *Oligorus gigas* of Günther, or *Centropristis gigas* of Owen truly belongs to this genus, the name of the Californian species must be replaced by another: that of *S. Californicus* will be appropriate.

Description of the Genus OXYJULIS Gill.

BY THEODORE GILL.

In the present article, there is given a detailed description of the genus *Oxyjulis* recently named, not hitherto described.

As the *Semicossyphus pulcher* (Günther ex Ayres) is only known through the description of Ayres, made at a time when the classification of the Labroids was far less exact that now, its generic position remains to be confirmed, although there is little doubt that it really is a *Semicossyphus*.

Genus SEMICOSSYPHUS Günther.

Synonymy.

=Semicossyphus *Günther*, Annals and Magazine of Natural History, ser. iii. vol. viii. p. 384; *ib.* in Catalogue of the Fishes in the British Museum, vol. iv. p. 99, 1861–2. *Bleeker*, Proc. Zoological Society of London, 1861, p. 415.

SEMICOSSYPHUS PULCHER Günther.

Synonymy.

Labrus pulcher *Ayres*. Proc. California Academy of Natural Sciences, vol. i. p. 3, 1854. *Ayres*, Proc. Boston Society of Natural History, vol. v. p. 101, 1854.

Semicossyphus pulcher *Günther*, Annals and Magazine of Natural History, ser iii. vol. viii. p. 384, 1861. *Günther*, Catalogue of the Fishes in the British Museum, vol. iv. p. 99, 1862.

Hab.—Coast of California, at San Diego, (Ayres).

Genus OXYJULIS Gill.

Synonymy.

= Oxyjulis *Gill*, Proc. Academy of Natural Sciences of Philadelphia, 1863, p. 223.

Julis sp., *Girard, Gill.*

Halichœres sp., *Günther.*

Pseudojulis sp., *Günther.*

Body elongated and slender, much compresssed and with the sides nearly flat, with the caudal peduncle oblong and not constricted; anus little in advance of the middle of the length.

Scales moderate, less than thirty along lateral line, small and closely appressed on the breast; each one is oblong, pentagonal, corrugated at the centre, with numerous lines radiating towards the back and posterior sides, and with fainter ones extending forwards; exposed surface rhomboid. Lateral line continuous, simply tubular, mostly concurrent with and near the back, but deflected on the scales under the posterior portion of dorsal, and thence continued on the tail along the middle to the caudal fin.

Head oblong, conic, and acute in front, slightly curved above and below, much compressed and gradually decreasing in width to the snout, transversely convex above. Snout longer than the eye. Eyes mostly or wholly in the anterior half of the head. Cheeks and opercula naked and unarmed; suboperculum with an oblong membranous extension. Nostrils simple, in front of upper angle of eye.

Mouth scarcely protractile, with the cleft scarcely oblique; intermaxillary bones thin, wide, and their plane surface nearly horizontal, their posterior processes broad and short; supramaxillary extended downwards at angle, but almost entirely behind the intermaxillary. Dentary rapidly increasing in height towards the angle.

Lips rather thin, with several folds.

Teeth on the crest of the jaw conic, curved uniserial, decreasing backwards, two or three anterior ones of the upper jaw much enlarged, but none behind.

Branchial membrane free below.

Branchiostegal rays six.

Dorsal fin with no scales at base, entire, commencing over or behind the base of pectorals, with nine spines, not produced beyond the membrane, but enveloped behind in a skinny extension; soft portion nearly even and subangulated behind.

Anal fin with three spines like those of the dorsal, and with the soft portion rather low.

Caudal fin subtruncated, covered at the base with small scales.

Pectoral fins rather narrow, obliquely truncated behind.

Ventral fins beneath or behind the pectoral, angulated at the end of the first ray.

D. IX. 13. A. III. 13.

Scales $27-28 \frac{2}{12}$

The lower pharyngeal bone is transverse and narrow, bow-shaped, and with much compressed narrow anterior process, regularly emarginated behind, in front gibbous on each side of the middle, and with the converging sides nearly straight; the posterior surface is vertical and extended downward, and from that a ridge crosses the bone towards its upper surface; the front is beset with about three rows of conic teeth, of which those of the hinder row are enlarged, and one or two rows are advanced on the front anterior process.

Oxyjulis is distinguished among all of its tribe by the produced acutely conic head; it differs from *Julis*, besides, in the more compressed body, the form of the jaws, and the presence normally of nine dorsal spines;* from *Pseudojulis*, it is separable on account of the form of the head, structure of the jaws, the brevity of the dorsal spines and their production in their cotaneous sheaths, as well as by the form of the lower pharyngeal bone.

Only one species of the genus is known which had formerly been referred by Girard and the author to *Julis*, and by Günther to *Pseudojulis*.

Oxyjulis modestus Gill.

Synonymy.

Julis modestus *Girard*, Proc. Academy of Natural Sciences of Philadelphia, vol. vii. p. 151, 1854. *Girard*, Explorations and Surveys for a Railroad Route, &c., vol. x. *Fishes*, p. 163.

Halichœres californicus *Günther*, Annals and Magazine of Natural History, ser. iii. vol. viii. p. 386.

Julis modestus *Gill*, Proc. Academy of Natural Sciences of Philadelphia, 1862, p. 142.

Pseudojulis modestus *Günther*, Catalogue of the Fishes in the Collection of the British Museum, vol. iv. p. 168.

Hab.—Coast of California.

* The number eight which was formerly assigned to the type of the genus is abnormal. Misled by its occurrence in the first specimen examined, and by its coincidence with the dentition of the typied *Julis*, I, too, hastily regarded it as a species of that genus as restricted by Gunther, and thus retained it in the same genus in which Girard had placed it.

Note on some recent Additions to the ICHTHYOLOGICAL Fauna of Massachusetts.

BY THEODORE GILL.

During a short sojourn in the summer of the present year at Wood's Hole, Massachusetts, Prof. S. F. Baird paid especial attention to the Fishes of that locality, and obtained specimens of forty-seven distinct species. Among these, there are three that have not before been noticed as inhabitants of the shores of Massachusetts. The three species are all well known and common along the Southern coast, and one of them was extremely abundant at Wood's Hole. Two belong to the family of Carangoids, and the genus *Trachynotus* and one to the genus *Cyprinodon*, of the Cyprinodont family. The *Trachynoti* were *T. carolinus*, of which many young specimens were secured, and *T. ovatus*, of which only two were obtained. The *Cyprinodon* was the *C. variegatus* Lac., and was found in very great numbers.

Since the publication of the several parts of Dr. Storer's illustrated "History of the Fishes of Massachusetts," ten marine species have been added. The following is a list:

1. SEBASTES FASCIATUS Storer, Proc. Boston Soc. Nat. Hist., v. 31.
Provincetown, Capt. Atwood.
A doubtful species.

2 CENTRISCUS SCOLOPAX Storer, op cit., v. 178.
Dr. Storer has noticed "a specimen of the Trumpet Fish (*Centriscus scolopax*) caught at Provincetown, the first known to have been taken on this coast." The specific identity of the specimen with *C. scolopax* requires confirmation.

3. ZENOPSIS OCELLATUS Gill, = ZEUS OCELLATUS Storer, op cit. vi. 888.
"Found at Provincetown, Mass."

4. PRIACANTHUS ALTUS Gill.
I am indebted for my knowledge of this species as a visitor to the Massachusetts coast, to Mr. F. W. Putnam, of Cambridge. He has kindly informed me that, since the species was described, two specimens have been examined by himself,—one from Providence, Rhode Island, mentioned in the Annual Report of the Trustees and Directors of the Museum of Comparative Zoology, (Cambridge) for 1862, and a second taken at Marblehead, Mass., and preserved in the collection of the Essex Institute.

5. AMMODYTES DUBIUS Reinhardt.
One specimen has been recorded by Dr. Günther (Cat. Fishes, iv. p. 387) as having been sent from Boston, by W. Winstone, Esq.

6. CILIATA ARGENTATA Gill, = *Motella argentata* Reinhardt.
A single specimen of this species has been obtained by Dr. Slack, at Nahant. It had been previously known only as an inhabitant of Greenland, or the open sea of high latitudes. Its occurrence at Nahant has been noticed in the Proceedings of the Academy of Natural Sciences of Philadelphia, for 1863, (p. 241).

7. TRACHYNOTUS CAROLINUS, Gill ex Linn.

8. TRACHYNOTUS OVATUS, Gthr. ex Linn.

9. CYPRINODON VARIEGATUS, Lac.

10. CRYPTACANTHODES INORNATUS Gill.
This species, first referred to under present name by Dr. Holmes, in his Report on the Fishes of Maine, has been found in the waters of Massachusetts, according to Mr. F. W. Putnam, who has kindly informed me that male and female specimens are preserved in the Zoological Museum of Cambridge. The species is extremely closely related to *C. maculatus* St. (= *Fierasfer? borealis* Dekay

St. ex Peck), but is entirely destitute of spots. The specimen which afforded the foundation on which it was inserted in the Catalogue of Maine Fishes was obtained by Dr. Stimpson several years ago.

The subclass of Elasmobranchiates has not been yet treated of in Dr. Storer's "History." Since the publication of his "Report," he has added several species of great interest. The species enumerated in the Report are the following:

Carcharias vulpes = Alopias vulpes *Bon.*
Lamna punctata = Isuropsis Dekayi *Gill*, (not *Sq. punctatus* Mit.)
Spinax acanthias = Acanthias americanus *St.* = Squalus americanus *Gill.*
Somniosus brevipinna Les.
Raia batis = Rara lævi *Mitchill.*
Carcharias obscurus* = Eulamia cœrulea *Gill.*

To these were subsequently added:

1. Cestracion zygæna Gill = *Zygæna malleus* St. Boston, Jour. Nat. Hist., iv. 185, = *Zygæna subarcuatus* St. op. cit. iii. 71.
2. Trygon centroura (Storer, op. cit. iv. 186.
3. Myliobatis bispinosus Storer, op. cit. iv. 187.
4. Tetronarce occidentalis Gill = *Torpedo occidentalis* Storer, Am. Jour. Sc. v. Arts, xlv. 165.
5. Mustelus canis Storer, Syn. Fishes N. A., p. 253 Mem. Am. Ac. ii. 505.
6. Eugomphodus littoralis Gill, = *Carcharias griseus* St., Proc. Boston Soc. ii., 1846, p. 256, = *Odontaspis*? sp. *Desor* op. cit. ii., 1847, p. 264.
7. Galeocerdo? sp. = Carcharias Atwoodi St., op. cit. iii., 1848, p. 72.

Note on the species of SEBASTES of the Eastern coast of North America.

BY THEODORE GILL.

Cuvier and Valenciennes, fully describing and figuring the *Sebastes norvegicus* as the type of the genus *Sebastes*, attribute to it a height at the pectorals contained rather less than three times and a half in the length, a head forming a third of the length, and an eye equalling a quarter of the head's length. The rays of the dorsal fin were XV. 15; of the anal, III. 8. The color was said to be uniform reddish, with a blackish spot towards the angle of the operculum. "This description was based on individuals from Norway and Newfoundland, which did not appear to differ in form."† Remembering how cautious those great naturalists were in identifying species from distant localities, there can scarcely remain any doubt that they had specimens of the true *Sebastes norvegicus* from Newfoundland. Since that period, its existence in Greenland, previously signalized by Fabricius, has been confirmed by Reinhardt and Günther. The *Perca norvegica* of Fabricius, and *Sebastes norvegicus* of Cuv. and Val., Richardson, Reinhardt, and Günther, are therefore without doubt the same as the species of Norway.

But in 1839, Dr. Storer, in his Report, described under the name of *Sebastes norvegicus*, a specimen whose head, "from tip of lower jaw when closed to posterior angle of operculum," equalled a third of the length, and whose *very large* eye had a diameter "equal to *one-third* the length of head."

Dekay evidently borrowed his description and figure of *Sebastes norvegicus* from the Histoire naturelle, and remarked that "this is a rare fish in our waters. It is called, by our fishermen, *Red Sea Perch*, and they say it is only

* Teeth above "in the middle of the jaw, one inch and two lines high, and one inch wide at their base;" "in the lower jaw, similar in their form and number, but smaller than those in the upper jaw."

† Hist. Nat. des Poissons, iv. p. 333.

found in deep water." "The coast of New York is probably its extreme southern limit." Such are the only remarks relating to the species as an inhabitant of the waters of New York. As Dekay's knowledge of its characters embodied in his work has been simply derived from Cuvier and Valenciennes, his testimony is useless in establishing the species as an American fish.

Dr. Storer, in his illustrated "History of the Fishes of Massachusetts," has redescribed the species noticed in the Report, and given a figure of it. That figure confirms his description of the size of the eyes, and exhibits great difference from that given by Cuvier of the true *Sebastes norvegicus*. Besides the larger eyes, it is evident that Storer's fish has a higher and shorter body, longer pectoral and ventral fins, a more elevated spinous dorsal, better armed head, &c., than the typical *S. norvegicus*. It therefore undoubtedly belongs to a different species, and that one is probably the *S. viviparus* of Kroyer.

Dr. Kroyer, in the "Naturhistorisk Tidsskrift" for 1844, published an article on the northern species of *Sebastes*, and gave a description of a new species under the name of *S. viviparus*. As the periodical in which this description was published is in few American libraries, the following abstract will be especially acceptable. The characters of *S. norvegicus*, taken from the same author, have been contrasted with those of *S. viviparus*.

SEBASTES VIVIPARUS Kroyer.*

Color† subaurantiacus, macula magna operculi nigricante (sæpe maculis corporis fuscis, interdum totus fuscus vel nigricans). Caput tertiam ferme æquat longitudinis partem, altitudinemque parum superat. Diameter oculi longitudinalis latitudinem frontis inter oculos multo [*in Norv. parum*] superat, æquat vero rostri longitudinem [*in Norv. multo est minor*], tertiam [*in Norv. quartam*] ferme longitudinis capitis partem, 9 am—10 amve [*in Norv.* 12 *mam*—13 *mam*] totius longitudinis partem, et $\frac{2}{3}$ [*in Norv. dimidium*] longitudinis a margine orbitæ posteriori ad marginem operculi posteriorem. Pinnæ pectorales quartam ferme complent longitudinis partem [*in Norv. breviores*] et pone marginem ani posteriorem extenduntur [*in Norv. haud attingunt*]; pinnæ ventrales quintam fere [*in Norv. sextam cerciter*] longitudinis partem æquant. Longitudo piscis novem pollices raro superat [*in Norv. sesquipedalis et ultra*]. Numerus radiorum.

P. D. XV. 13 (13–14). A. III. 7 (6–8) C. 15. P. 18 (17–18).

P. D. XV. 15. A. III. 8. C. 15 P. 19 (*in Norv.*)

On comparison of the characters of the common *Sebastes* of Massachusetts, Maine and Nova Scotia with the preceding description, it is found that the latter is quite applicable to that species, as regards color, size of head, height, size of eye, &c., extent of pectoral and ventral fins, the size which the species attains, and finally the number of its rays. It is only necessary to add that, in addition to the opercular, there is found a large spot between the posterior half of the dorsal fin and the lateral line, and frequently another, less distinct, on the side, which are doubtless the ones alluded to by Kroyer in the phrase, "*sæpe maculis corporis fuscis.*" The number of soft rays, as stated by Kroyer, is most frequently thirteen in the dorsal and seven in the anal fins. The following variation was found in thirty specimens selected from those preserved in the Smithsonian Institution.

In one,	D. XV. 12.	A. III. 7.
" two,	D. XV. 13.	A. III. 8.
" thirteen,	D. XV. 13.	A. III. 7.
" ten,	D. XV. 14.	A. III. 7.
" one,	D. XV. 14.	A. III. 8.
" two,	D. XV. 15.	A. III. 7.
" one,	D. XVI. 13.	A. III. 7.

* Kroyer Naturhistorisk Tidsskrift, ser. ii. vol. i. (1844–5,) p. 28.

† Color (in *S. norvegicus*) aurantiacus, nullis maculis distinctis; etiam lingua et fauces aurantiacæ; membrana branchiostega intus colore matris perlarum.

The presence of fifteen dorsal rays or eight anal rays is an exceptional character.

As the *Sebastes norvegicus* of Storer thus agrees in all respects with the description by Kroyer of his *S. viviparus*, there can be little doubt that it really belongs to that species. At the same time, it must be remembered that the latter has not been recorded as an inhabitant of Greenland; and as the Ichthyology of that country is even better known than that of the United States, it will be at least desirable to confirm the identification of our species with *S. viviparus* through the comparison of typical specimens.

Although it has been demonstrated that the species referred by the American zoologists to *S. norvegicus* does not belong to that species, it is nevertheless probable that the latter really does inhabit our coasts. I have been informed by Dr. Stimpson that the common species is found in comparatively shallow water, while another *larger species of a fine red color, called Rose-fish*, is found in deep water; but among the very numerous specimens of *Sebastes* seen by me, no example of such a form has been detected.

Finally, Dr. Storer* has briefly noticed a fish under the name of *Sebastes fasciatus*, in the following terms:

"Body elongated, not convex in front of dorsal fin, as in the *Sebastes norvegicus*. Four distinct dark, brown, transverse bands upon the sides, the broadest at the posterior portion of the body. Length $3\frac{3}{4}$ inches.

"Fin rays as follows: D. 13—14. P. 20. V. I. 5. A. III. 3—7. C. 19."

The species was discovered by "Captain N. E. Atwood, of Provincetown, and found in the harbor of that place."

This is the only information we have regarding that species. It has been stated to me by an able ichthyologist that it was only the young of *S. norvegicus* (i. e. *S. viviparus*), but on applying to Dr. Storer, he has written that the number of rays given in his description is correct. Such being the case, it is scarcely possible that the preceding statement can be correct; and it would rather indicate that the "new species" belonged to the genus *Sebastichthys*, but too little is known of it to admit it in the system as a valid species.

It has thus been established:

1st. That the *Sebastes norvegicus* Cuv. et Val. has not yet been confirmed as an inhabitant of the New England coast.

2d. That the species referred to under that name by American ichthyologists, is the *S. viviparus* of Kroyer or an extremely closely related species.

It may be hoped that some one of the numerous ichthyologists of Massachusetts will confirm the right of *S. norvegicus* to be considered as an American fish, and at the same time settle the relations of the *S. fasciatus*.

Dec. 1*st.*

MR. VAUX, Vice-President, in the Chair.

Nineteen members present.

A letter was read from Mr. William Short, Louisville, Ky., Nov. 20th, placing at the disposal of the Academy the herbarium of the late distinguished botanist, Professor Charles W. Short, of that city.

The following resolutions were offered and unanimously adopted:

Resolved, That the thanks of the Academy be tendered to the family of the late Dr. Charles W. Short, of Louisville, Ky., for the exceedingly valuable donation of his herbarium, announced this evening.

Resolved, that the thanks of the Academy be tendered to Prof. Asa

* Storer, Proc. Boston Soc. Nat. Hist., vol. v. p. 31, 1854.

Gray for his exertions in securing for the Society the herbarium of the late Dr. Short, of Louisville, Ky.

Dec. 8th.

Dr. Carson, in the chair.

Twenty members present.

The following paper was presented for publication:

"On some new and singular intermediate forms of Diatomaceæ." By F. W. Lewis, M. D.

Dr. Morris mentioned that a nest of owls, Strix pratincola, had been found in the turret of a church on Rittenhouse Square.

Dec. 15th.

The President, Mr. Lea, in the Chair.

Thirty-two members present.

The following paper was presented for publication:

"Synopsis of the Species of Hosackia." By Asa Gray.

Dec. 22d.

The President, Mr. Lea, in the Chair.

Sixteen members present.

The following was presented for publication:

"Synopsis of the Echinoids collected by Dr. W. Stimpson." By A. Agassiz.

Dec. 29th.

The President, Mr. Lea, in the Chair.

Twenty-nine members present.

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

On some New and Singular Intermediate forms of DIATOMACEÆ.

BY F. W. LEWIS, M. D.

About three years ago I made a gathering from the marsh bordering a shallow pond, situated in the Notch Valley, (White Mountains,) from the Southern end of which the Saco river takes its rise. This pond is fed by numerous mountain streams of small size, which nearly always dry up during the heats of summer. Its principal source of supply is in the springs which well up from beneath the morass, in the centre of which the pond lies.

This gathering was principally composed of particles of the adjacent rocks, mixed with some vegetable debris. It contained both Diatomaceæ and Des-

midiæ in abundance. To the former of these alone I propose directing attention, not only on account of the singularity of their departure from established generic types, but also because of certain points of great speculative interest illustrated by their peculiar grouping, and the unique and isolated nature of the deposit in which they occur.

My friend, Prof. L. W. Bailey, of Frederick, N. B., who is at this time devoting himself specially to the study of the interesting question of the geological bearing of the Diatomaceæ in determining the relative antiquity of fossil beds in the State of Maine and the adjoining country, in a letter to me of some time back, alludes to the fact of the extreme rarity of the genera *Synedra* and *Nitzschia* in any of the *sub-peat* deposits of the northern section of the United States, although, as he adds, both are quite common in surface gatherings.

His observations I understand to apply to sub-peat (fresh water) deposits alone, and not to the mixed class of alluvial deposits like the Hudson and Delaware river muds, or, in fact, to any foreign post tertiary deposits as those of Mull and Glenshira, which in many respects differ from cotemporaneous beds in this country.

My own experience agreeing with Prof. Bailey's so far, at least, as regards the rarity of these genera in the sub-peat of this country,* the discovery of the forms contained in the Saco pond was peculiarly interesting to me, as it seemed to foreshadow the abundant introduction of the Syncdroid genera, by presenting a series of intermediate types between these and *Surirella*.

In advancing my theory of the geological and structural position of these new species, I must premise, however, that it is, in a great measure, founded on a conjectural basis, and from the very nature of the points involved, insusceptible of positive proof. I shall, therefore, in describing these species, confine myself to a brief notice of the principal facts which appear to me to sustain my views, reserving for a future occasion the consideration of such collateral evidence as I may have derived from other sources, but which the limits of the present paper forbid my here introducing.

This gathering, as before stated, was derived from the margin of a pond supplied by the springs which feed the river Saco. The position of this pond and its surroundings I am particular in describing, for reasons which will be apparent hereafter. It lies on the eastern side of the Crawford intervale, and is surrounded by other and smaller ponds, which dry up during the summer. It is about 200 feet long, rather less in width and very shallow. At its southern extremity is the outlet of the small streamlet which forms the beginning of the Saco river. A few small mountain brooks empty into it laterally, but the main source of its supply appears to be certain springs welling up from underneath the alluvial detritus forming the pond bottom, which overlies a thin stratum of clay, beneath which is the boulder drift. A sparce growth of grass fringes the northern margin of the pond, and on its southern and western aspect is a boggy patch with a good deal of moss, but this appears to be quite superficial, and at a few inches below the surface is the same alluvial till without much vegetable debris. Similar conditions of soil seem to hold at other points in the valley. It is in this fine and soft mud, at from one to four inches below the surface, beneath and immediately around the waters of the pond, that the silicious remains of the new species are most abundant.

The gathering is principally remarkable for two points:

Firstly. The striking analogy which exists between its species and those of the sub peat deposits of the northern section.

Secondly. The occurrence of several forms belonging to a known genus—*Surirella*—so peculiar and variable in their characters as almost to merit the

* *Synedra ulna*, *S. radiaris*, *S. lunaris*, *S. biceps* and two or three species of *Nitzschia* occur sparingly in several sub-peat localities.

title of *transitionary*, by which term I mean that these forms may be regarded as just such aberrant varieties of that genus as we might expect to find conducting to the *Genera Nitzschia* and *Synedra*, which, on this continent, appear to have followed the genus *Surirella* at a long interval of time. They exhibit, moreover, such very unusual variation, both as to size, configuration and definition of distinctive character; such want of generic fixity, to so express it, as might be supposed likely to mark the incoming of new Genera.

Although there may exist reasonable ground for doubt as to whether the lines which separate two of these genera (*Surirella* and *Amphipleura*,) or some of their species, are not founded on structural degradation, rather than on true and definite characteristics, the evidence I have to offer is, as yet, not sufficiently digested to make it in any respect conclusive of the matter. It will be briefly stated hereafter in the consideration of species. In the meantime I prefer to consider these eccentric members of the Surirellæ as illustrations of the "*Comprehensive*" type of *Dana*, (*Synthetic* of Agassiz,) which he explains to be "one which embraces, along with the characteristics of the group to which it belongs, others of another group, and usually at its first appearance this group is not in existence." "It is in part" (he adds,) an "*intermediate* type between two groups, although never occupying the middle point, as it always belongs fundamentally to one of the two, while partaking of some of the characteristics of the other. This comprehensive type, moreover, becomes extinct with the progress of the system of life, while the types which it foreshadowed, or partly comprehended in itself, are long afterwards perpetuated," and such, to all appearance, has been the fate of these curious intermediate links between the genera in the present case.*

In conformity with this definition of the comprehensive type, a careful comparison of these Nitzschoid and Synedroid varieties has convinced me that all of the doubtful and imperfectly defined species really belong to *Surirella*; even the necessity of creating a *Subgenus* for their accommodation being obviated by the clearly marked progressive series of intermediate forms connecting the normal type of *Surirella* with the most aberrant varieties in the Saco mud.

The species first to be described I have named after the late Prof. Bailey.

I. Surirella Baileyi, n. sp. F. V. Oblong linear, with rounded extremities. V. linear lanceolate, slightly attenuated near the central portion, with the rounded apices more or less produced. Alæ conspicuous. Canaliculi well marked; striæ usually distinct up to the well defined central line. Owing to the great variation both in the number and fineness of the striæ and canaliculi, I have not attempted to estimate their average. *Habitat*: in the soft mud about and under the roots of the grass at the north end of the pond. The silicious valves occur, as is the case with nearly all the succeeding species, in greatest abundance at from two to six inches below the surface.—Fig. 1, a, and b.

This form is rare in the gathering. It is an exceedingly elegant little species. The smaller valves of what I believe to be the same form, bear a superficial resemblance, in outline and punctulation, to *Nitzschia* the alæ and canaliculi becoming so much dwarfed as to be nearly invisible. A careful manipulation of the valve dispels this apparent similarity, reducing both lines of seeming puncta to the same plane, and also defining their structural value as alæ.

Although no doubt can exist as to the claims of this species to rank as a *Surirella*, I have preferred to first describe it before proceeding to the forms hereafter to be noticed, which depart widely and eccentrically from the type of the genus in question, for the reason that some of its varieties serve as an introduction to these latter, whose anomalies they, in a measure, explain.

* Manual of Geology, page 395.

Therefore, before leaving *S. Baileyi*, I desire to call attention to the Synedroid* character of the smaller varieties, together with their apparent degradation of generic character, as points which will be found intensified in the species next to be described.

II. Surirella intermedia, n. sp. Frustules free. Valve linear, strongly sigmoid with attenuate rounded apices. F. V. straight or slightly sigmoid, expanding at the subtruncate extremities. *Alæ* usually distinct, twisted near the ends of the valve, giving rise to a spathulate appearance. Canaliculi numerous, inconspicuous, reaching the narrow central blank line. Striæ distinct, variable as to number and fineness, as in *S. Baileyi*. For the same reason I have not estimated their average. Fig. 2, a, and b.

Var. β. With the same general outline, only much smaller. Alæ and canaliculi rudimental. Occurs in groups of from two to five; probably sporangial.

This remarkable species, more curious and anomalous in its character than the preceding, is quite abundant in the pond. For a good while I was disposed to regard it as an aberrant variety of *Nitzschia* or *Amphipleura*, but a more careful study of the structure of the valve led me to refer it to *Surirella*.

The points of resemblance which seem to me to place it in that genus are: the presence of *well-marked alæ* and of tolerably distinct *canaliculi*, structural appendages never found in *Synedra*, *Nitzschia* or *Amphipleura*, to which genera *S. intermedia* is allied by external configuration and curvilinear attenuate proportions. Of a certain superficial resemblance to the punctulation of *Nitzschia*, visible in the small frustules of what may be regarded as the sporangial brood of *S. intermedia*, it is hardly necessary to speak, as a careful study of the intermediate varieties of this diatom shows that these seeming puncta are, in reality, only miniature alæ.

Before going further, it may be as well, for convenient reference, to give the definitions of those genera most nearly allied to this species and its varieties. In order that the relative importance of their respective points of resemblance to the new species may be more readily apprehended, I have italicized those special characters of each genus represented in *S. intermedia:*

Surirella.	*Synedra.*	*Nitzschia.*	*Amphipleura.*
(Says Prof. Smith,) is distinguished by the following characters: "*Frustulus free*, ovate or elliptical. *Valves* with a *longitudinal central line* and *margins produced into alæ. Canaliculi distinct*, usually parallel." He further adds that, "It is well distinguished from *Tryblionella* by the prominence of its alæ and the usual cuneate form of its frustules.—*With no other form is it likely to be confounded.*"	"*Frustules elongated wand like*, attached by the lower end. *Lateral surfaces equal to or less than the front view: traversed by a smooth line.*" (Last character omitted by Prof. Smith.)	"Frustules *free*, *elongated*, compressed. "*Valves linear*, keeled with one or two longitudinal lines of puncta. "Keel frequently eccentric."	"Frustules *free*, *linear*, with *longitudinal ridges.*"—(Vide *Surirella anceps*, n. sp.) Generic characters admitted to be obscure by Prof. Smith.

It will be seen, by reference to the italicized portion of these definitions, that although the characters belongiug to these genera, represented in *S. intermedia* are about equal in *number*, this is far from being the fact as regards their structural significance, which in the case of those noted in *Surirella* is much more considerable than in any of the others.

* I employ the term "Synedroid' here and elsewhere in this notice, to designate these forms, as, although the apparent punctulation in some of them is more suggestive of *Nitzschia* than of *Synedra*, they never present any trace of keel.

Considered as *generic*, these characters may be classed as *essential* and *non-essential*. The *former* of these divisions embraces such structural characters as *median* and *terminal nodules*, *central lines*, *alæ*, *costæ* or *canaliculi*. These appear to bear to their parent organism a relation somewhat similar to that held by the tracheæ and stigmata of insects or the nutritive vessels of plants in their own sphere. Among them the susceptibility to variation is notably less than in the *latter* or non-essential class, in which may be placed such shifting and superficial characters as *size*, *external configuration*, *striation*, &c. These ought more properly to be regarded as mere accidental phenomena, constantly modified by agencies depending on climate, locality, soil, and the mineral constitution of the water which contains the diatomaceous growth.

This tendency to extreme variation in these non-essential characters is forcibly illustrated everywhere throughout this country by the strange modifications of size, shape, striation, punctulation, and even condition of aggregation, observable in such species as *Navicula firma* and *N. rhomboides*, under differing conditions of locality and reproductive agencies.*

Assuming, then, that all these variations in size, shape, striation, &c., when observed in Diatomaceæ, are *non-essential* phenomena, let us review the facts relating to the species under consideration. We have here a form, which, by virtue of the possession of two of the most invariable and *essential* of generic characters, viz., *alæ* and *canaliculi* is allied to *Surirella*, one of the most ancient and widely distributed of known genera, and to *Nitzschia*, *Synedra* and *Amphipleura*, more modern and weaker genera, by the *non-essential* character of external configuration, and in the case of *Amphipleura* by the occasional presence of submarginal ridges, a resemblance only observable, however, in the smaller or sporangial brood of *S. intermedia* and *S. anceps*, n. sp., hereafter to be described. To *Nitzschia*, the likeness of these smaller frustules is more marked, and I am disposed to think that the form figured in Prof. Gregory's paper on Fossil Diatomaceæ. (Trans. Mic. Soc. No. viii. Mic. Journal,) as *Nitzschia sigmatella*, may be an undeveloped specimen of the present species. From *Nitzschia*, however, the absence of any trace of keel, together with the fact of the arrangement of the marginal puncta upon the same plane, sufficiently removes *S. intermedia*. From these facts it seems probable that this curious diatom is in reality a *transitionary* or *comprehensive type species* which, along with other forms in the gathering, themselves *comprehensive*, departing more or less widely from the typical *Surirella* and tending towards the Synedroid type, has resulted under certain peculiar and exceptional circumstances while the modern peat was being deposited.

To explain the apparent anomaly of the presence and perpetuation of this assemblage of influences in this particular locality, will be my endeavor when proceeding with the description of the species, although I am fully aware that my premises, founded on the presumed geological relations of the Saco deposit to the sub-peat and to the surface soil are, as previously stated, not fairly proven.

As a preliminary, I may state those conditions which appear to be essential to the developement and fixity of this and other intermediate forms constituting so unique and eccentric a grouping in the Saco mud.† These may be assumed to be:

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* My friend Prof. H. L. Smith, of Ohio, informs me that he has found *N. rhomboides* in the condition of a Colletonema.

† It may be urged that in the foregoing remarks on these species and their relations to the typical *Surirella*, I have advanced the idea of gradual generic transmutation, rather than the true theory of the *comprehensive type*, which implies no such *serial* progression as is apparent in the present instance. To this objection I would observe that, while no such serial progression is implied, neither is it inconsistent with this theory; for the intermediate type differs from a subgenus, not only because it does not transcend the *essential* characters of genus, but for the reason also, which makes it superior to ordinary species and varieties, viz., that it possesses pecu-

Firstly. "A low grade in the scale of organic life, implying great capacity for variation.

Secondly. "A long period of time during which these exceptional forms could have been produced and perpetuated."

The first of these conditions will be readily admitted; the *second*, however, which touches more directly on my hypothesis, requires some notice. Several considerations might be urged in proof, of which the most important seem to me to be the following:

1. "The absence of these comprehensive forms in the *sub-peat* deposits, and also as *recent* species elsewhere."

2. "The general resemblance of most of the living species of the Saco pond to those found in the sub-peat, and the very partial representation of genera common in surface gatherings in the neighborhood and elsewhere." This general resemblance must not be understood as implying that the Saco species, or many of them at least, are not to be found as living forms in other streams and ponds in this country, but that the proportion grouping and prevailing varieties of species common to both do not correspond; at the same time, as before stated, surface genera, such as *Nitzschia*, *Tryblionella*, *Cymatopleura*, *Cocconema*, *Epithemia*, *Odontidium*, *Amphipleura*, &c., are either absent or but feebly represented in the Saco.

3. "The occurrence of irregular and eccentric forms having no analogues in either fossil or recent deposits. Such a one is *Actinella*, (new genus, hereafter noticed,) and others of the new species, together with species not hitherto found living in this country or elsewhere, I believe, as *Eunotia hemicyclus* (Ehr.) *Eunotia incisa* (Gregory) and singular varieties of *Himantidium*.

The presence of an abnormal or irregular type like *Actinella punctata*, a form which seems to have nearly disappeared from other localities as a living species, is not perhaps so much a direct evidence of a long continued chain of modifying causes as it is of an intermediate, but no longer (elsewhere) active assemblage of influences.

In this connection, and in view of the apparent contradiction involved in the continued operation of these influences in the present case, I now proceed to state more distinctly the explanatory hypothesis founded on the probable geological relations of the Saco deposit to the subjacent formation.

It is that these forms represent a series of *intermediate species* peculiar to the modern *peat*, and more specially to its earlier history, occurring only under exceptional circumstances, their continuance as living organisms in the Saco being accounted for by favorable influences derived from the thin stratum of boggy soil, till and clay, which overlies the valley drift, and through which well up the Saco springs, whose waters may thus in *transitu* acquire properties by virtue of which, conjointly with other exceptional local causes, species and varieties, no longer existing elsewhere, may continue to flourish.

I may be excused for citing one or two facts which lend plausibility to this somewhat fanciful hypothesis, viz., the isolated nature of the deposit on which the forms occur, and the comparative absence of the contained species on the surface of the mud which paves the pond, as well as upon the growth of grass and moss which lines its margin. Although several smaller ponds lie in the immediate neighborhood, one being separated by a few yards only from the Saco, in no case have I succeeded in finding in any of them specimens of these new species, of *Eunotia hemicyclus*, *E. incisa*, or even of *E. diadema*, a common Saco form. This same remark holds good also with regard to several small mountain brooks which empty into the pond

liar relations to another genus towards which some subtle, natural force, some intrinsic bias, is impelling it.

This bias, constituting the very essence of the intermediate type, it would seem to matter but little, should the forms expressing it be single or several between a group, sub-group, family or genus; or whether they represent a series more or less progressive, providing that the *essential* limits of the natural division to which the type belongs be not overstepped.

from the west and north, the Diatomaceæ found in all these being principally such genera and species as are found in most northern localities. I may add that the Saco stream, at a short distance from its point of emergence from the marsh, contains none of the new species. From these facts it seems reasonable to infer that the local conditions which favor the development of these are confined to a circumscribed area. Further, that these conditions do not depend on any peculiarity in the vegetable growth which lines the margin and extends for a short distance into the pond, is highly probable, as this seems to be in all respects similar to that surrounding the streams and ponds adjoining; nor can it be said that there is any characteristic peculiarity of the surface soil serving to distinguish it from that elsewhere found in the valley bottom, in which I have vainly searched for the silicious remains of these organisms.

These facts of exclusion, in my opinion, go far to prove that the causes which have perpetuated these varieties depend in no small degree on the mineral constitution of the springs up-flowing from under the valley "muck" or till, of which I am assured only a superficial covering overlies the boulder drift at this point, and also, perhaps, to telluric impressions derived indirectly from other sources.

In further corroboration of this view, I refer to the presence in the gathering of the living *Eunotia hemicyclus*, a species which has heretofore only occurred in fossil deposits, of *Eunotia incisa*, also a fossil form, and to the greater abundance and larger size of the siliceous valves of the new species at from two to five inches below the surface mud. This is particularly the case with regard to *Surirella anceps*, next to be described, the remains of which are rarely met with in any quantity at a less distance than two inches below the pond bottom.

I shall reserve for future consideration whatever corroborative evidence of the long period of time required in the production of these forms is afforded by the tendency to extreme variation manifest in nearly all the species, and by the disposition shown by some of them to assume a punctate arrangement, such as characterizes *Actinella punctata*, and to a less marked degree *Tabellaria* in the deposit.

III. Surirella anceps, n. sp. The species now to be noticed I have referred to *Surirella*, not without hesitation. Frustules free, linear, F. V., straight or very slightly sigmoid. V. Sigmoid, elongated with rounded subacute extremities (in outline singularly vermiform.) Alæ very small (sometimes nearly obsolete) or submarginal: canaliculi very inconspicuous, often wanting: *striæ*, very sharp and clear, extending to the wide and well defined central space which runs from end to end of the V. [Over the *inner* aspect (?) of the valve the striæ appear to be continuous, or this phenomenon may be exceptional. I have frequently met with valves in which the striæ were uninterrupted and have been unable to focus anything resembling a central line or even traces of alæ, and this fact has induced me to think that the thickness of the substance of the valve may have prevented my doing so.] Color of dry frustule, rich chesnut-brown.

This species is quite as common as the preceding, although not as a living organism. It occurs most abundantly in the mud which envelopes the roots of the grass and plants at the northern end of the pond, and appears to be an older species than *S. intermedia*, and I may add, a stronger one, as notwithstanding the remarkable subordination of generic character and the evidence of greater degradation from its type visible, it is less variable, both in size, outline, and striation than this latter. Fig. 3, a and b.

The slight and imperfect development of the alæ and canaliculi in this species requires a careful management of light to enable their being viewed satisfactorily. They are best seen by using a condenser of moderate angular aperture.

The rudimental alæ, which in the Fig. 3, a, are represented as marginal, occasionally assume a submarginal position, and when this occurs in the smaller valves, it would be difficult for any one not familiar with the larger varieties to distinguish them from *Amphipleura sygmoidea*, to which species the resemblance is very marked. The brackish habitat and much finer striation of this latter diatom, however, make it impossible that they can be identical.

In Fig. 3, b, the peculiar arrangement of the alæ is tolerably well shown, as rendered from the dry valve. These it will be seen are feebly defined, and, owing to their somewhat exceptional (for *Surirella*) relations to the valvular surface, present an inverted appearance. Viewed from what I believe to be the inner aspect of the valve, they are hardly distinguishable from puncta, and occasionally seem to be obsolete. Owing to the brittleness of the connecting membrane, it is difficult to get a front view of the frustule, excepting in the recent specimen, and the valve is best studied by burning this upon a thin glass cover.

IV. SURIRELLA DELICATISSIMA, n. sp. The next species is exceedingly minute and variable. Frustule straight. F. V. Linear slightly inflated with rounded ends. V. linear lanceolate, sometimes centrally constricted, with produced, rounded, or subacute extremities. Alæ marginal, inconspicuous; canaliculi obsolete; striation very delicate.

This very minute form is abundant both in the Saco and Wolfboro' muds; but being feebly silicious and the valve highly refractive, it is apt to be overlooked in acid-boiled and balsamed specimens. It varies greatly in outline and definition of alæ. The Fig. 4, a, b, represents the most usual form. The marginal lace-like border is very elegantly displayed, in the larger frustules burnt on glass.

This species is specially interesting, as approximating a step nearer the Synedroid type, in the absence of canaliculi, and the attenuated form of the valve.

It may, perhaps, turn out to be an early stage of *S. Baileyi*. The specimen figured is magnified 1000 diameters.

I now pass on to consider a very curious and anomalous diatom nearly allied to *Eunotia*, and more remotely to *Asterionella*, but with points of difference from either, so decided as, in my opinion, to require its isolation in a separate genus. This, from the radiant arrangement of the frustules, I propose terming "ACTINELLA," nov. gen. "Frustules linear arcuate, with an unequally notched inflation at one extremity, and terminal nodules, usually forming, by the adherence of the smaller ends, a stellar grouping."

V. ACTINELLA PUNCTATA, n. sp., is the only species yet found. Frustules linear, arcuate, commonly in radiating, symmetrical clusters of from six to twelve individuals. "F. V. straight, slightly cuneate, narrowing gradually from the extremities towards the centre; ends more or less truncate. V. arcuate with a well marked notched inflation at the free extremity, smaller (attached) end rounded, with terminal nodules and sharp convergent striæ, and a row of marginal puncta." Habitat on the surface mud. Fig. 5, a, b and c.

The idea first suggested by the singular irregularity of development in this diatom, is rather that of accidental deformity, than that of definitive and permanent character, and this view I was disposed to adopt, until after the discovery of specimens altogether identical, from another and distant locality.

Like most of the Saco species, *A. punctata* enjoys a very extended range of variation in size, length, proportion, definition of striation and punctulation; in no case, however, has the distinctive peculiarity (the unequally notched inflation) been found absent. Indeed, so invariable is it that a few worn valves, in the mud, dredged from Wolfboro' inlet, (Lake Winnipisseogee), at least sixty miles distant from the Saco pond, present this same special char-

acter; and recent gatherings, after a period of three years, show no difference in this respect.*

The peculiar notched inflation, which appears to be a fixed character of this diatom, equally with the tendency to punctate arrangement observable in several species in the gathering, possesses a certain significance, as showing how strongly a dominant *Nitzschoid* (*Synedroid*) leaning exists throughout the group. I have before alluded to the disposition to marginal punctulation evident in *A. punctata*, *Tabellaria flocculosa*, and one or two doubtful smaller forms in the Saco mud, as affording probable illustration of a sympathetic intrinsic force, tending towards the *Nitzschoid* type. In *A. punctata* there would seem be, as it were, a double exercise of this attractive force, conducting, not an allied form, but one only remotely connected with it, towards the same type. The antetype in the present case would appear to be *Eunotia*, between which and the *Synedroid* genera this anomalous form constitutes an intermediate or comprehensive link.

Eunotia (*monodon* to *polyodon*) is the prevailing form in the gathering. It occurs with every peculiarity of dorsal prominence, from a faintly perceptible undulation to the sharpest and most serrate crenature, a fact singularly opposed to the experience of the late Prof. Gregory, who limited this tendency to vary to the two species, *E. bigibba* and *triodon*. Now this disposition to extreme variation, even in *non-essential* characters like the above, in species not ordinarily variable, concurring with a comprehensive type like *A. punctata*, induces me to think that these varieties of *Eunotia*, illustrate a series of successive approaches to the *Nitzschoid* type, which has culminated in the case of *E. polyodon* in the abnormal and irregular genus I am describing. This, had it not been for the peculiar mode of its growth and aggregation in stellar groupings, would have ranked as an aberrant *Eunotia;* and, in fact, before meeting with the living form, I had distributed specimens under the name of *Eunotia fibula*. It has the arcuate form, terminal nodules and convergent striation, which usually characterizes that genus, and presents some curious points of analogy to the prevailing species, *E. polyodon*, in respect to the resemblance betwcen the notched inflation of *A. punctata*, and the two terminal undulations of the valve in the former diatom. The ventral or concave aspect of both is similar, or nearly so, and the terminal nodules and striation do not materially differ. By suppressing all the dorsal elevations, excepting the terminal one at one end of *E. polyodon*, and attenuating the valve, a form in outline nearly identical with *A. punctata* is obtained. In suggesting this resemblance, I do not wish to imply that *Actinella* has resulted by progression or degradation from this or any other species of *Eunotia*, but merely to infer the possibility that, in accordance with the laws which govern the comprehensive type, the non-essential character of dorsal crenulation common to the latter genus and its ally *Himantidium*, is becoming merged into the smooth lines of the Synedroid genera.†

To *Asterionella* this form presents very few points of resemblance. The mode of growth is somewhat similar, but the frustules are essentially different. Both, it is true, are bacillar forms, and possess unequally developed ends; but the valve of *Asterionella* is straight and symmetrical, while that of *Actinella* is curved and unequally bifid at the larger end, which is free, and not, as in case of the former genus, attached to its fellows by the adjacent angles.

* In this connection and in corroboration of the view before advanced, I may state that the Wolfboro' mud was taken from a stream whose bottom has relations to the valley drift very similar to those of the Saco deposit. Besides *A. punctata* I have been able to identify three of the Saco n. sp. in this mud, viz., a degenerate variety of *Surirella intermedia*—*S. delicatissima*, with generic characters still more repressed—and a third form too imperfectly characterized to admit of present classification.

† A further illustration of this bias towards the Synedroid type is afforded in the case of *Himantidium gracile*, in this gathering, whose frustules are in many cases so attenuated and dehiscent as to render it difficult, if not impossible, to distinguish them from those of *Synedra*.

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The group of frustules, moreover, is not always symmetrical, or arranged upon the same plane.

VI. TRYBLIONELLA? or DENTICULA? n. sp.

The form figured at No. 6 of the plate occurs sparingly in this deposit, and more abundantly in the Wolfboro', but not in sufficient quantity to enable me satisfactorily to determine its true generic position. It seems to be solitary. Providing it be not a *Denticula*, its analogies to *Tryblionella* are stronger than to any other genus. The valvular surface is transversely and continuously striate, with no indication of a central line. The costæ are marginal.

This diatom is very minute.

Leaving a further consideration of this curious species, to which I hope to be able to return on a future occasion, I shall briefly conclude this somewhat protracted notice, by calling attention to one or two points in connection with the mode of growth and extreme variation of a few of the known species in the Saco mud.

(1.) *Eunotia hemicyclus* I have sometimes found growing like *Synedra lunaris:* several frustules attached to a fixed point. *E. hemicyclus* is not abundant in the gathering, and varies somewhat in the amount of its curve. The extremities are usually bevelled off into a subacute conical point. (2.) *Surirella intermedia*, in its smaller sporangial or embryonic form, commonly occurs in groups of from three to four parallel frustules. I have not found it in bundles like *Homeocladia* or *Colletonema*, but the position of the frustules is somewhat suggestive of those thalloid growths. *Navicula rhomboides* is similarly arranged. It presents a remarkable range of variation, as does *N. firma*. (3.) *Eunotia incisa* is very variable in outline and striation. It shows a tendency to unequal development at the extremities. These varieties or anomalies I propose figuring in a paper on the Diatomaceæ of the River Delaware blue clay, to be shortly presented to the notice of the Academy, and which was originally intended to be combined with the present communication.

I have, in noticing these species, purposely placed them in the order in which they occur, beginning with that most remote from the Synedroid type, and ending with those which approximate most nearly to *Synedra*. Whatever opinion may be entertained concerning the theory of the geological position of these forms, will not, I think, materially invalidate the following points, which are fairly deducible from the premises:

(1.) That the species and varieties in this deposit are singularly like, like those of the sub-peat.

(2.) That there is a notable absence of surface genera—*Nitzschia*, *Amphipleura*, *Tryblionella*, *Cymatopleura*, *Fragillaria*, *Odontidium*, &c., &c., all of which occur in adjacent localities.

(3.) That certain exceptional forms are present, which appear to represent types intermediate between the fossil *Surirella* and *Eunotia*, and the more modern genus, *Syncdra* (and *Nitzschia?*), *Surirella Baileyi*, *S. intermedia*, *S. anceps*, *S. delicatissima*, illustrating the synthesis in the case of the former, and *Actinella* in the latter, (*Eunotia.*)

(4.) That these forms are exceedingly rare, and seem to be confined to localities having peculiar conditions of soil, which, in all likelihood, depend on the mineral constitution of the water percolating through it.

(5.) That there is an unusual tendency to variation in nearly all the species, and a strong disposition shown by some of them to become attenuate and elongated, and also to assume a marginal punctate arrangement, suggestive of a Nitzschoid bias.*

*I may add that this same tendency to extreme variation affects the Desmidiæ which abound in this locality. This is particularly the case with *Triploceras verticillatum*, (Bailey), which beautiful and showy Desmid presents every variety of outline and proportion reconcileable with specific identity. The prevailing variety differs from that fixed by Bailey, in the more unguiculate character of the terminal horns, and the inclination of the knot-like prominences.

(6.) That there is reason to suppose that these species are nearly extinct as living organisms; although to what extent they may have flourished in a previous epoch, and how universally have been diffused, can only be a matter for speculation, until further and more thorough investigations in this, and other localities, shall have been made.

References to Plate.

(1.) Surirella Bailcyi, a, V. b, F. V. n. sp.
(2.) " intermedia, a, V. b, F. V. "
(3,) " anceps, a, V. b, F, V. "
(4.) " delicatissima, a, V. b, F. V. "
(5.) Actinella punctata, nov. gen. a, V. b, F. V. c, group of frustules × 100 d.
(6.) Denticula? or Tryblionella, n. sp.
(7.) Amphora intermedia, n. sp.
(8.) Navicula, n. sp.
(9.) Mastogloia elegans, n. sp.
(10.) Amphiprora pulchra, Var. B. = A. conspicua (Greville).

These are all magnified about 500 d, excepting *Surirella delicatissima*, which is amplificd to 1000 d. The Figs. from 7 to 10, inclusive, illustrate a paper on the Diatomaceæ of the Delaware River and marine localities adjacent thereto, which will be submitted to the Academy in a short time.

Synopsis of the species of HOSACKIA.

BY ASA GRAY.

§ 1. SYRMATIUM, Vogel. (*Drepanolobus*, Nutt.) Legume small, subulate or caudately attenuate, often torose, incurved or sickle-shaped, 1–4-seeded. Keel of the corolla not attenuate upwards, mostly obtuse. Claws of the petals slightly exserted or included; that of the vexillum somewhat distant from the others. Perennial herbs or suffruticose plants, or one species annual. Leaves 3—7-foliolate, with a very short petiole and rhachis. Stipules in the form of small black glands. Flowers small, in sessile or short-peduncled umbels, yellow, or sometimes whitish, often changing to reddish.

* Shrubby or suffruticose, with rigid slender branches, glabrous or glabrate, the young parts often silky puberulent, with (3—5, commonly 3) small and thick leaflets, somewhat sempervirent.

1. H. JUNCEA, Benth. in Linn. Trans. 17, p. 366. Shrubby, erect, bushy-branched, broom-like, with obovate, oval, or oblong leaflets, and very short peduncled few-flowered umbels; the calyx-teeth extremely short and blunt!—California. The only specimens before me are an original one of Douglas' collection, and those of Dr. Brewer, recently collected in the mountains near San Luis Obispo, in the Geological Survey of California.

2. H. SCOPARIA, Nutt. (under *Drepanolobus*), in Torr. & Gray Fl. *Syrmatium glabrum*, Vogel, in Linnæa, 10 (1836), p. 591. Almost wholly glabrous, shrubby, erect, 2—8 feet high, very bushy-branched and broom-like; with linear-oblong or barely oblong (obtuse or acute) leaflets, and strictly sessile umbels, which are usually crowded along the flowering branchlets, so as to form a virgate interrupted inflorescence. Teeth of the calyx subulate and acute, varying from one quarter to nearly half the length of the narrow tube. California, common from San Francisco to San Diego.

Var. DIFFUSUS (*H. crassifolia*, or *Drepanolobus crassifolius*, Nutt., l. c.), is a

decumbent, suffruticose, apparently dwarfed, less smooth form of the above species, which probably varies a good deal, according to situation and season.

3. H. CYTISOIDES, Benth. l. c. (*Drepanolobus cytisoides* and *D. rubescens*, Nutt. l. c.) Suffruticose, minutely silky-pubescent on the young parts, or soon glabrate, decumbent or sarmentose; with obovate, oblong, or linear-oblong obtuse leaflets, and many-flowered umbels, on a peduncle which often considerably exceeds the leaf, but is sometimes very short; the calyx-teeth about half the length of the tube, subulate aristiform and recurved! California, near San Francisco and Monterey.

** Suffrutescent or nearly herbaceous, diffusely decumbent, silvery white with appressed silky pubescence or tomemtum, the branches somewhat virgate.

4. H. SERICEA, Benth. Silky-canescent, much branched, ascending. Leaves mostly trifoliolate and subsessile; leaflets oblong-linear, or the larger ones spatulate-oblong. Umbels subsessile and few-flowered. Teeth of the calyx short or minute, in original specimens from Douglas about one-third the length of the turbinate-campanulate tube; in those recently collected by Dr. Brewer (Geol. Survey of California), very short. Flowers small, 3 lines long, yellow: the incurved apex of the keel somewhat acute. California; rare.

5. H. ARGOPHYLLA, Gray, Pl. Thurb. p. 316. *H. argentea*, Kellogg, in Proceed. Calif. Acad. 7, p. 38, fig. 8? Densely silky-tomentose, the long and rather simple branches decumbent. Leaves 3—5-foliate; leaflets obovate, obtuse (3—6 lines long). Umbels 8—12-flowered and with a unifoliolate bract, capitate; the peduncle short, sometimes very short, occasionally longer than the leaf. Teeth of the calyx slender, about half the length of the cylindraceous tube. Flowers 4 or 5 lines long, yellow, occasionally turning reddish; the broad incurved apex of the keel obtuse.—Southern and interior part of California; Thurber, Bigelow, Wallace, Newberry, &c. The specimen from Mr. Wallace has peduncles of considerable length.

Var.? FREMONTI. Leaflets obovate-oblong and acute; the flowers 5 lines long; the teeth of the calyx setaceous and almost as long as the tube.—Eastern side of the Sierra Nevada. The length of the calyx-teeth varies considerably in species of *Hosackia*.

††† Herbaceous, or scarcely suffrutescent at the base, pubescent, tomentose, or glabrate, diffusely procumbent or prostrate. Leaflets 3—5, sometimes 6 or 7, not thick, not silvery-white; the petiole or rhachis not abbreviated.

† Teeth of the villous calyx slender. Plants silky or tomentose-pubescent. Seminiferous part of the legume short, little longer than the calyx, canescent.

6. H. TOMENTOSA, Hook & Arn. Bot. Beech., p. 137, and certainly of p 332. *Syrmatium tomentosum*, Vogel, l. c. Loosely tomentose-villous with whitish or fulvous spreading hairs. Leaflets obovate, 4—7 lines long. Umbels capitate, 6—12-flowered, and with a unifoliolate bract; the peduncle sometimes hardly any, sometimes nearly equalling the leaf. Teeth of the very villous calyx setaceous subulate, fully the length of the turbinate-campanulate tube. Flowers 3 to 4 lines long, mostly turning reddish; the keel very obtuse.—California, San Francisco to Santa Barbara.

7. H. DECUMBENS, Benth. Silky with appressed pubescence; stems decumbent from a lignescent root or caudex, rather rigid. Leaflets cuneate-obovate, rhombic-ovate or obovate-oblong, cinereous, 4 or 5 lines long. Umbels capitate, many-flowered, and with a 1—3 foliolate bract; the peduncle distinct, but seldom equalling the leaf. Teeth of the silky-downy calyx equalling or shorter than the campanulate tube. Flowers nearly 5 lines long, apparently

unchanging yellow; the keel somewhat produced or narrowed at the incurved apex, acutish.—Oregon and Washington Territory.

8. H. HEERMANNI, Durand & Hilgard, in Pacif. R. R. Surv. 5, part 3, p. 6, t. 4. Villous-pubescent, diffusely much branched (from a "suffruticose" base?) very leafy. Leaflets obovate, roundish, or oval-oblong, 2—5 lines long. Umbels 4—9-flowered and with a unifoliolate bract; the peduncle often equalling the leaf. Teeth of the loosely villous calyx considerably shorter than the campanulate tube. Flowers 2 lines long, yellow turning purplish; the keel with a broad and very obtuse summit.—Southern part of California. Tejon Pass, Dr. Heermann. Near Los Angelos, Mr. Wallace. A very branchy and floribund species, the pubescence in kind nearly that of *H. tomentosa*, but far finer and less copious.

Var.? ORBICULARIS. *H. orbicularis*, Torr, ined. Villous-downy: the leaflets almost orbicular, 1½ to 2 lines long; and the umbel only 3—5-flowered.—Sand hills near San Francisco, California, Rev. A. Fitch. Flowers small in proportion, scarcely larger than in the next, and perhaps a form of that species,

9. H. MICRANTHA, Nutt., l. c., under *Drepanolobus*. Diffusely procumbent from an apparently annual root, minutely villous-pubescent, at length glabrate, slender. Leaflets mostly 5 or 6, obovate-oblong, 1½ to nearly 3 lines long. Umbels 3—5-flowered and without a bract, short-peduncled. Teeth of the pubescent calyx not half the length of the tube. Flowers only a line and a half long; the short incurved apex of the keel obtusish. California. Here described, not from the original of Nuttall, from near Monterey, but from a specimen in Mr. Durand's herbarium, named by Nuttall, from "Catalina," probably therefore collected by Dr. Gambell. The root seems to be annual.

10. H. PROSTRATA, Nutt., l. c., under *Drepanolobus*. *H. decumbens*, var. *glabriuscula*, Hook. and Arn. Bot. Beech. p. 137? ex. char. Glabrate, the nascent parts minutely silky-puberulent, diffusely procumbent; the branches slender. Leaflets 5 or 7, oblong-obovate, obtuse, about 3 lines long. Umbels lax, 5—10-flowered and with a unifoliolate bract, on slender peduncles exceeding the leaves. Teeth of the campanulate calyx very short. Flowers 3 lines long, yellow tinged with red. Said by Nuttall to be "suffruticose," but the specimen before me does not indicate it. Coast of the southern part of California, Nuttall.

§ 2. EUHOSACKIA, Benth. Legume linear, straight or nearly so, not rostrately attenuate. Keel of the corolla not falcately attenuate upwards, mostly very obtuse.

* *Subpalmatifoliæ*. Petiole short or nearly wanting, bearing 3—6 crowded-pinnate or quasi-palmate leaflets. Stipules reduced to blackish glands. Peduncles 1—2-(rarely 3—4-) flowered: bract unifoliolate, rarely 3-foliolate. Flowers yellow, turning purple. Vexillum tapering to the base, but hardly unguiculate, not distant from the other petals; keel very much shorter than the wings, straightish, narrowish; claws not exserted out of the calyx. Stems branching, from a perennial root, rigid.

† Peduncles elongated, all exceeding the leaves.

11. H. RIGIDA, Benth. Pl. Hartw. p. 305. Silky or cinereous-pubescent, a span to a foot high. Leaflets 3—5, crowded on a very short petiole, cuneate-oblong or obovate. Teeth of the calyx shorter than the tube. Monterey, California, Coulter. I have seen no Californian specimen of this. But I now refer to it some plants which I formerly took for varieties of the next species, especially Dr. Bigelow's from Williams' River, a tributary of the Colorado on the eastern or New Mexican side, (in Bot. Whipple's Exped.

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p. (79) 23,) one of Dr. Newberry's collction from Sitgreaves' Pass, also Thurber's, 243 and 307, from New Mexico, and perhaps Wright's, 1357; but the last is doubtful.

12. H. PUBERULA, Benth. l. c.; Gray, Pl. Wright, 1, p. 50; Torr. in Pacif. R. R. Surv. 7, t. 4 (bot.) Minutely appressed-puberulent. Leaflets 3—6, on a more developed petiole or rhachis, linear, lanceolate, or the lowest oblong. Teeth of the calyx attenuate, as long as the tube. Mexico, Arizona to S. W. Texas.

†† Peduncles seldom as long as the leaf, often shorter than the solitary flower, some of them reduced to nothing; the short pedicel, with the pair of black glands at the articulation, arising directly from the axil.

13. H. WRIGHTII, Gray, Pl. Wright, 2, p. 42. Cinereous-puberulent, bushy-branched, very leafy, Aspalathus-like; the 3—5 leaflets (the lowest oblong, the rest filiform-linear) crowded upon the apex of a barely perceptible petiole, appearing therefore as if palmate and sessile. Teeth of the calyx setaceous-subulate, about the length of the tube. Flower pretty large. New Mexico.

** *Veræ*. Leaves obviously pinnate; the (5—21) leaflets distributed along a more or less elongated rhachis. Peduncles bearing a few many-flowered umbel, which is usually subtended by a 1—5-foliolate bract: this, however, is occasionally wanting or represented by a leaf low down on the peduncle. Vexillum on a slender claw, more or less distant from those of the other petals. Root perennial, except in one species.

† Peduncles (elongated) 2—4-flowered, occasionally 1-flowered: pedicels very short. Stipules scarious, but small or minute. Claws of the (yellow) petals a little exserted out of the tube of the calyx: keel broadly dilated upwards, very obtuse.

14. H. LATHYROIDES, Durand & Hilgard, in Pacif. R. R. Surv. 5, part 3, p. 6, t. 3. Low, cinereous-puberulent. Leaflets 5—7, not crowded, linear-lanceolate, acute at both ends. Bract unifoliolate or sometimes wanting. Teeth of the calyx broadly subulate, shorter than the tube. California: San Joaquin River, Heermann; Los Angeles, Wallace.

15. H. ANGUSTIFOLIA, G. Don. ex Benth. *H. Mexicana*, Benth., in Linn. Trans. *H. longipes*, Nutt. ined. Slender. Leaflets 5—9, obovate or linear, short, often canescent beneath. Bract trifoliolate at the apex of the 1—2-flowered peduncle. Teeth of the calyx slender, nearly as long as the tube. Mexico.

†† Peduncles umbellately many-flowered, mostly shorter than the leaf, bearing the bract below its apex, or a leaf lower down which represents the bract. Stipules scarious or in one species foliaceous. Flowers rather small, dull-colored, greenish-white or yellowish with purple, the keel slightly incurved, very obtuse, moderately shorter than the wings. Calyx-teeth not half the length of the tube. Leaflets 9—21, oval or oblong.

16. H. INCANA, Torr. in Bot. Whippl. Exped. Pacif. R. R. Surv., 4, p. 79, (23,) t. 4. Low, canescently very villous throughout; the bract near the apex of the peduncle, mostly 5-foliolate. Yuba, California, Dr. Bigelow.

17. H. STIPULARIS, Benth. *H. macrophylla*, Kellogg, in Proc. Calif. Acad., 2, p. 123 and 126, fig. 40. Rather tall and stout, the upper part of the stem, petioles, peduncles, &c. villous, the leaflets glabrate. Stipules large and foliaceous, or the upper sometimes smaller and almost scarious. Peduncle bearing a 3—9-foliolate leaf in place of a bract, much below the umbel. California.

18. H. CRASSIFOLIA, Benth. in Linn. Trans. *H. stolonifera*, Lindl. Bot. Reg. t. 1977. *H. platycarpa*, Nutt. in Torr. and Gray Fl., in fruit only. Tall and stout; the stems nearly glabrous; the leaflets (9—15, thickish) minutely pubescent or soon glabrous. Bract or floral leaf mostly tri-foliolate and mostly above the middle of the peduncle. Calyx-teeth very short. A pubescent variety (*H. stolonifera*, var. *pubescens*, Torr., l. c.) not only retains considerable down on the leaves, &c., but even the calyx and pedicels are pubescent. Oregon and California.

††† Peduncles usually equalling or exceeding the leaves, bearing a 4—12-flowered umbel (or the lowest sometimes only 1—3-flowered), the bract at its apex, or wanting. Stipules scarious. Flowers yellow, and partly white or rose-purple, half an inch or more long; the keel abruptly inflexed at the apex, acutish, a little shorter than the wings. Calyx-teeth at least nearly half the length of the tube. Leaflets 5—9, rarely 11.

19. H. OBLONGIFOLIA, Benth. Pl. Hartw. p. 305; Torr. l. c., which is appressed-pubescent, with 9—11 narrowly oblong and acute leaflets, a unifoliolate bract, the calyx-teeth a little shorter than the tube, I do not possess; but it is said to be otherwise much like the next species. California; Coulter, Parry.

20. H. BICOLOR, Dougl. in Bot. Reg. t. 1257. *Lotus pinnatus*, Hook., Bot. Mag. t. 2913. Glabrous, rather tall, with 5—9 obovate or oblong leaflets and no bract, or rarely a small unifoliolate one; the calyx-teeth about half the length of the tube. Corrolla yellow, the keel often white. The bract certainly does now and then occur, as, for instance, even in my specimen of Hartweg's, No. 1698. Oregon and California.

21. H. GRACILIS, Benth.; Torr. Bot. Mex. Bound., t. 15. Equally glabrous and more slender than the foregoing, a span to a foot high, weak and spreading, with large stipules, 5—7-leaflet, those of the lower leaves often 3 and obovate-cuneate; the umbel subtended by a petioled 3-foliolate bract; the calyx-tube scarcely longer than the teeth. Corolla with the keel and wings purple or tinged with rose-color. California.

†††† Peduncles several-flowered (or the lowest sometimes 1—3-flowered), the 1—3-foliolate bract at its apex, or sometimes wanting. Stipules reduced to blackish points or glands, often deciduous. Claws of the petals slightly, if at all, exserted from the tube of the calyx: keel straightish, dilated upwards. Legumes glabrous. Leaflets not exceeding 7.

‡‡ Flowers large, keel small, very much shorter than the ample wings.

22. H. GRANDIFLORA, Benth. l. c. *H ochroleuca*, Nutt. in Torr. and Gray, Fl. Tall (1—5 feet high), softly, more or less pubescent. Leaflets 5—7, oval or oblong. Peduncles elongated. Flowers 7—11 lines long; teeth of the calyx subulate from a broadish base, shorter than or about as long as the tube; corolla yellowish or greenish white often tinged with purple. California.—Originals of Nuttall's *H. ochroleuca* and Bentham's *H. grandiflora*, now before me, are identical, both being of the less pubescent forms, with moderate-sized flowers, and the calyx-teeth about as long as the tube. The specimens which best exemplify the specific name have flowers almost an inch long, and a short and soft pubescence.

Var.? ANTHYLLOIDES, Gray, in Proceed. Calif. Acad. ined. Low, a foot high or less, velvety-pubescent. Leaflets of the upper leaves acute or pointed. Peduncles scarcely exceeding the leaves. Calyx-teeth attenuate, about as long as the tube. Corolla (7 lines long) white and purplish-red. Island of Catalina, Mr. Wallace; an intermediate form. Sta. Lucia Mountains, Dr. Brewer. A remarkable form, but in which I cannot detect characters warranting a specific distinction.

[Dec.

‡‡ Flowers rather small, 4 or 5 lines long : keel broad, about the length of the wings. Root annual : rhachis of the leaves somewhat dilated. (A transition to the next division.)

23. H. MARITIMA, Nutt. in Torr. and Gray, Fl. Diffusely spreading from an annual root, minutely strigose-puberulent or almost glabrous ; stems from a span to nearly a foot long. Leaflets mostly 5, succulent, oval or obovate (4—6 lines long). Peduncles about equalling the leaves, 3—5-flowered, or the earliest 1—2-flowered. Bract, 1—3-foliolate, or sometimes none. Calyx-teeth linear-subulate, rather longer than the tube. Corolla bright yellow. Santa Barbara and Los Angeles, California.—Not having any original specimens, I have before taken specimens of *H. strigosa*, Nutt. for *maritima*. But the original of the latter proves to be identical with a plant which I have received from Mr. Wallace, and recently from Dr. Brewer, which is clearly of this rather than the succeeding section, having a 4—5-flowered umbel in well-developed specimens, and the vexillum on a slender claw, remote from the wings, as in typical *Hosackia*.

*** *Uniflorœ*. Leaves obviously pinnate or pinnately trifoliolate ; the rhachis more or less dilated. Stipules reduced to blackish glands. Peduncles 1-flowered, (rarely 2-flowered). Claws of the petals not exserted, that of the vexillum short, and approximate to the others. Small and diffuse annuals ; the flowers small, yellow, often turning rose-purple or reddish.

† Pubescent, 4—9-foliolate. Keel broad, and almost straight, very blunt much shorter than the wings. Vexillum tapering into a short claw.

24. H. STRIGOSA, Nutt. *H. microphylla*, *nudiflora*, *strigosa*, and *rubella*, Nutt. in Torr. and Gray, Fl. Diffusely spreading or ascending, strigosely, pubescent. Leaflets linear-oblong, or obovate (1—5 lines long). Peduncles equalling or exceeding the leaves ; the bract of the apex 1—5-foliolate or sometimes wanting. A very variable little annual, the forms of which I can divide into three sets ; one with the flowers 4 or 5 lines long and the peduncle bracteolate (*H. strigosa*, Nutt.) ; another with the flowers 3 or 4 lines long and the bract wanting or minute (*H. nudiflora*, Nutt.) ; and a third with the flowers (occasionally in pairs) two lines long, the bract 1—3-foliolate or often wanting (*H. rubella* and *H. microphylla*, Nutt., in herb. Durand, under the name of *H.* (*Psychopsis*) *micrantha*, Nutt.). Some forms have been mistaken for *H. maritima*. California, along and near the coast and rivers.

†† Glabrous throughout, 3—6-foliolate. Keel somewhat narrowed at the inflexed apex, acutish, nearly equalling the wings. Vexillum subcordate.

25. H. PARVIFLORA, Benth. in Bot. Reg. *Lotus micranthus*, Benth. in Linn. Trans. Pale, well marked by its perfect smoothness (or a slight pubescence on nascent parts), and the minute flowers (barely 2 lines long), scarcely surpassing the 1—3-foliolate bract. Peduncle 2 to 8 lines long. The form of the keel is nearly that of *H. bicolor* and *H. gracilis*. Oregon and California.

§ MICROLOTUS, Benth., excl. sp. Legume of § 2, sometimes barely oblong. Keel of the corolla attenuated upwards, or as it were rostrate, falcate, mostly acute, equalling or exceeding the wings. Vexillum on a short claw, not distant from those of the other petals, which, moreover, are not exserted. Annuals. Leaves 1—5-foliolate, the lower leaflets scattered on a more or less dilated rhachis. Stipules reduced to minute dark glands. Flowers small, (yellow, sometimes changing to orange or purple) not umbellate.

Of these following species only it is a question whether they should not be referred to *Lotus*.

† Peduncles longer than the leaves, bearing a single flower accompanied by

a unifoliolate bract. Calyx-teeth much longer than the tube, almost equalling than the corolla. Leaves subsessile, pinnately trifoliolate or the upper sometimes unifoliolate. (*Psychopsis*, Nutt. in Torr. and Gray, Fl.

26. Hosackia Purshiana, Benth. in Bot. Reg. *Lotus sericeus*, Pursh. *Trigonella Americana*, Nutt. Gen. *Hosackia unifoliolata*, Hook. *H. elata, floribunda, pilosa*, and *mollis*, Nutt. in Torr. and Gray, Fl. A wide-spread and variable species, from a few inches to a foot or more high, smoothish, or even glabrous, pubescent, or soft-villous; the leaflets varying from ovate to lanceolate. North Carolina to Nebraska, Oregon, and California.

†† Flowers subsessile and mostly solitary in the axils of the leaves, ebracteate. Corolla exceeding the calyx. Leaves 3—5-foliolate; the leaflets obovate or oblong, mostly attenuate or scattered on the wing-dilated rhachis. Small, procumbent or depressed annuals.

27. H. subpinnata, Torr. and Gray, Fl. *Lotus subpinnatus*, Lag.; Hook. and Arn. Bot. Beech. t. 8. *L. Macræi*, Benth., forma subglabra. *L. Wrangelianus*, Fisch. and Mey. *H. Wrangeliana*, Torr. and Gray, l. c., forma glabrata. Villous-hirsute or glabrate. Teeth of the calyx about the length of the tube, or scarcely longer. Legume linear-oblong, 4—7-seeded, as in foregoing species, very much exceeding the calyx. The smoothish variety, with a glabrous legume (*Lotus Macræi*, Benth.), appears different enough from the very hairy form, which is less common in California. But intermediate states abound. *Anisolotus anthylloides*, Bernh., of the gardens, appears to be a slender and procumbent form. Chili, California, and Oregon.

28. H. brachycarpa, Benth. Pl. Hartw. p. 306, No. 1073. Softly villous with long and whitish hairs, very much branched from the base, diffuse or procumbent; the flowers rather larger than in the last; the attenuated teeth of the calyx very much longer than its tube, and equalling or fully half the length of the oblong or linear-oblong very obtuse villous 2—4-seeded legume. California, on the Sacramento, and in that region. Dr. Brewer has collected greener and luxuriant specimens of this species, approaching *H. subpinnata*, having flattish pods which exceed the calyx; but the species still appears to hold good.

*** *Obscure Species.*

H. balsamifera, Kellogg, in Proceed. Calif. Acad. ii. p. 125, said to be very viscid and villous, and to have pedunculate umbels, is wholly unknown to me.

Synopsis of the ECHINOIDS collected by Dr. W. Stimpson on the North Pacific Exploring Expedition, under the command of Captains Ringgold and Rodgers.

BY ALEX. AGASSIZ.

The collection of Echinoids brought home by Dr. Stimpson was at first placed in the hands of Mr. James M. Barnard for identification. Other occupations having prevented him from finishing the task he had undertaken, the collection was sent to Cambridge, where it was arranged while I was engaged in cataloguing the Echinoids of the Museum of Comparative Zoology. The specimens have thus been compared with the greater part of the originals of the Catalogue Raisonné of Prof. Agassiz, which are in the collection at Cambridge. Dr. Stimpson has collected so largely that the species which had not been described before, and which are here briefly noticed, form a large addition to the number of Echinoids previously known to science. He has visited several of the localities from which the French explorers had brought to the Jardin des Plantes many of the species mentioned in the Catalogue Rai-

sonné of Agassiz. The collection made at the Bonin Islands was particularly valuable in a historical point of view, as it enabled me to obtain precise knowledge concerning the species of Echinoids which Mertens had collected there, and which, though described by Brandt in his Prodromus, had never been compared with the species described by Prof. Agassiz about the same time. The annexed list is intended simply as a catalogue to give an idea of the value of the collection, and the author hopes to return to this collection on another occasion, and to give more lengthy descriptions, and figures of the most interesting species. The notes of Dr. Stimpson, of the colors, and of the depth at which the Echinoids were found, have been added in quotation marks. These notes correspond to numbers attached to the specimens at the time they were collected.

PHYLLACANTHUS Brandt, Prod.

Syn. *Leiocidaris* Des., Syn. Echin. Foss.

PHYLLACANTHUS DUBIA Brandt, Prod.

This species is, at first glance, so closely related to *P. imperialis*, that unquestionably many of the errors which have been made in referring to *P. imperialis* this species, which is found in the Northern part of the Pacific Ocean, arose from this close resemblance. The spines of *P. dubia* are more slender than those of the *imperialis*. The longitudinal furrows are deep, equally well marked along the whole length of the spine. It can at once be distinguished from its congener by the narrowness of the median ambulacral zone, which does not equal in width the poriferous zone; the latter is somewhat depressed.

"Found among madrepores in one fathom, Port Lloyd, Bonin Islands. Secondary spines of a deep purple; primary spines ash color."—(W. Stimpson.)

PHYLLACANTHUS FUSTIGERA Barn. MS.

Small species, having one row of small tubercles round the scrobicular circle of the ambulacral plates. Furrow joining the ambulacral pores very deep. The spines are slightly plicated at the extremity; the whole surface minutely granulated. They are of a dark violet color, with two yellowish rings placed about one-sixth of an inch apart, below the point where the plications commence.

Taken at Puloe Leat Island, Gaspar Straits, Capt. Stevens.

GARELIA Gray. Proc. Lond. Soc., 1855.

GARELIA CINCTA A. Ag., Bull. Mus. Comp. Zool., 1863. Syn. *Echinothrix Turcarum* Pet??

"Spines of a purplish black color. Fine blue semicircular rays on the body, among the bases of the spines, may be often noticed."

"Hilo Hawaii. Found in rock crevices and under flat corals in the 4th subregion of the littoral zone. Port Lloyd, Bonin Islands."—(W. Stimpson.)

DIADEMA (Peters emend.) Seeig. v. Mossamb.

DIADEMA PAUCISPINUM A. Ag., Bull. Mus. Comp. Zool., 1863.

"Hilo Hawaii."—(W. Stimpson.)

DIADEMA NUDUM A. Ag.

Under the name of *Diadema turcarum* no less than three different species have been confounded. According to Peters, who had a specimen of what he calls *D. turcarum*, it is an *Echinothrix*, entirely different from the *D. setosum* of Rumph., which he says is a true *Diadema*. Having examined in the collection of the Museum at Cambridge, a remarkable sea urchin, received from the Sandwich and Kingsmill Islands from Mr. Garrett, which agrees suffi-

ciently with the figure of Rumphius of *D. setosum*, Pl. 14, fig. 5, to show that they belong to the same genus, I find that it is an entirely different genus, which have I named *Echinostrephus*, Bull. Mus. Comp. Zool., 1863. The figure of Leske, Pl. 37, figs. 1, 2, which is also always quoted as *D. turcarum*, is a true *Diadema*, probably identical with the species which I have called *D. nudum*. The *D. turcarum*, or the *Echinothrix turcarum* of Peters, is a *Garelia*, and not *Echinothrix*, Peters having included in his genus *Echinothrix*, several species which had already been separated by Gray as a distinct genus from *Diadema*, *Garelia*. The *Echinothrix turcarum* Pet. may prove identical with the *Garelia cincta*, mentioned above, but as I have no specimens, and only the figure of Rumphius, I am unable to decide this point.

"Body everywhere, spines included, of a purplish black color. Soft parts bluish grey. Anus margined with light blue."

"Hong Kong, China, in crevices of rocks, 1 fathom."

"Island of Ousima, below l. w. m."—(W. Stimpson.)

THRICHODIADEMA A. Ag.

Ambulacra of a true *Diadema;* pores arranged in irregular vertical arcs of three pairs of pores; not spreading near the actinal region. Two rows of large tubercles in the ambulacral space. Interambulacral area with two vertical rows of large tubercles extending from the mouth to the abactinal region; on each side of these rows tubercles smaller than the ambulacral, arranged in vertical rows and not in oblique rows, as is usual in the Diadematidæ. Abactinal system almost circular, which distinguishes this genus at once from all other known genera of this family. Shell thick; tubercles crenulated; spines resembling those of *Echinothrix*, but stouter and more tapering.

THRICHODIADEMA RODGERSII A. Ag.

Tubercles of ambulacra crowded together with a double zig-zag row of small miliary tubercles. Tubercles of interambulacral area arranged in eight vertical rows. Anal membrane small, covered with minute elliptical plates. The verticillations of the spines very close; whorls arranged in such a way that the surface of the spines appear longitudinally striated. Outline seen from above perfectly circular, regularly arched when seen in profile.

"Taken in clefts of rock at l. w. m. in Port Jackson, N. S. W. Color of a deep reddish purple."—(W. Stimpson.)

HETEROCENTROTUS MAMMILLATUS Br., Prod.

Dr. Stimpson had the good fortune to find at the Bonin Islands a number of specimens of a species of *Heterocentrotus*, which are undoubtedly the *H. Postellii* of Brandt. After carefully comparing the specimens with the originals of *Acrocladia hastifera* Ag., *A. mammillata* Ag., I have satisfied myself that the different species which have been distinguished principally by means of the great differences in the spines, are simply individual differences. The peculiar mode of growth of the spines by concentric longitudinal layers, giving rise in different specimens to bat-shaped, triangular, cylindrical or club-shaped spines. In specimens in which the spines have been broken and have grown out again afterwards, we find the best proof of the identity of these different modes of growth.

"Bonin Islands and Hilo, Hawaii."—(W. Stimpson.)

PODOPHORA QUOYI A. Ag., Bull. Mus. Comp. Zool. 1863.

"Hilo, Hawaii."—(W. Stimpson.)

COLOBOCENTROTUS LESKEI Br. Prod.

"Black above, dark reddish brown below; a circle of bright red around the mouth. On surf-washed rocks in 4th l., Port Lloyd, Bonin Islands."—(W. Stimpson.)

When specimens have remained some time in alcohol the spines become ash colored.

Colobocentrotus can readily be distinguished from *Podophora* by its peculiar ambulacra, the tubercles of which are arranged in four vertical rows, the median space raised above the poriferous zone; there is a strong depression between the tubercles of consecutive plates. The interambulacral plates are separated by a well marked suture on the abactinal side.

PARASALENIA GRATIOSA A. Ag., Bull. Mus. Comp. Zool., 1863.

"Body everywhere black; spines dark olive, with a ring of white at base of each.

"Among madrepores in 1 f. Port Lloyd, Bonin Islands."—(W. Stimpson.)

ECHINOMETRA BRUNEA A. Ag.

Differs from *E. lucunter* by the great height of the polar diameter of the test, as well as the uniform size of the tubercles and spines.

"Among coral at l. w. m., Bouin Islands."—(W. Stimpson.)

ECHINOMETRA LUCUNTER Lamk.

"Hilo, Hawaii."

"On the coral reefs of Tahiti."

"Body always dark purple; spine greenish; mouth red. Bonin Islands, in crevices of rocks and coral in 4th l."—(W. Stimpson.)

"Loo Choo Islands.

"Ousima."—(W. Stimpson.)

These specimens have been examined side by side with specimens compared to the originals of Lamarck sent to the Museum at Cambridge, through the kindness of Prof. Valenciennes. This species has been so often quoted by different explorers as occuring at localities as far apart as the West Indies, the Cape of Good Hope, Mauritius, East India Islands, in the Pacific Ocean, at the Low Isl., the Sandwich Isl., &c., that it became an interesting question carefully to compare specimens from these different localities. It became at once apparent that we had one species in the West India Islands, (*E. Michelini* Des.,) one species at Mauritius, Zanzibar, (*E. acufera*,) associated with *E. lucunter* Lamk., so that the true *E. lucunter* of Lamarck is not confined to the Pacific Ocean, and seems to enjoy a very extensive range of distribution. Besides the localities here mentioned there are specimens in the Museum of Comparative Zoology at Cambridge from the Kingsmill Islands, the Society Islands and the Navigators Islands, and also from Tor in the Red Sea, which have been received from the Imperial Museum at Vienna.

Heterocentrotus mammillatus Br., appears almost always associated with *E. lucunter*. These two Echinoids are particularly characteristic of the great Belt which extends on both sides of the Equator from the east coast of Africa to the Sandwich Isls. *Hipponoë sardica* Gray, which is also quoted as occurring with these two species, may prove identical with *Hipponoë violacea* A. Ag., but the materials on hand at present are not sufficient to decide this point, as it is extremely difficult to ascertain what are specific differences in this family of Hipponoidæ, owing to the great difference between the young and the adult. Young specimens of the common *Tripneustes ventricosum*, from Florida, having even been placed into a new genus, *Heliechinus*, by Girard, (*Heliechinus Gouldii*, Gir.) Supposing, formerly, that this species (*E. lucunter*) had not been described, and many specimens having found their way into other Museums from the collection at Cambridge under the name of *Echinometra picta* A. Ag., I take this opportunity to correct my mistake.

ARBACIA AEQUITUBERCULATA Gray, Proc. Zool. Soc., 1855.

"Madeira."

"Porto Praya, Cape de Verde Islands."—(W. Stimpson.)

GLYPTOCIDARIS A. Ag.

Pores arranged as in *Heliocidaris*, in narrow, irregular rows; do not spread near actinostome. Tubercles crenulated; spines tapering, long. Two principal rows of interambulacral and ambulacral tubercles; miliaries not numerous.

GLYPTOCIDARIS CRENULARIS A. Ag.

Median interambulacral space bare; tubercles increasing very gradually towards the lower edge, where they are large. Four short rows of small tubercles on lower surface. Spines long and stout, longitudinally striated, resemble those of the genus *Acrocidaris*.

"Light brown or pale reddish brown. One specimen was greenish brown; another cream colored."

"In 6 f. shelly bottom, comparatively rare. Hakodadi Bay, Isl. of Jesso."—(W. Stimpson.)

TOXOCIDARIS DELALANDI A. Ag., Bull. Mus. Comp. Zool., 1863.

"Color reddish or purplish, sometimes brownish. Common about l. w. m. and in 4th l., under stones. Port Jackson, N. S. W."—(W. Stimpson.)

TOXOCIDARIS NUDA A. Ag.

Great size of the actinostome; cuts not as deep as in other species of this genus; pores arranged in arcs of 5—7 pairs; tubercles of interambulacral space far apart, two rows very prominent, far exceeding in size the others; miliaries few and small; secondary tubercles small, equal in size to the ambulacral tubercles, which are arranged in two rows; spines of dried specimens of a bluish color.

"Hilo, Hawaii."—(W. Stimpson.)

"N. E. end of Niphon."—(W. Stimpson.)

TOXOCIDARIS CRASSISPINA A. Ag.

Miliaries few in number; ambulacral and interambulacral tubercles of equal size; spines long, equalling in length the diameter of the test; coronal plates high; pores arranged in regular arches from 9 to 10 pairs, diminish in number on lower surface.

"Color entirely black, except a little reddish below the mouth. Not uncommon under stones and in crevices of rocks in 4th l., Ly-ee-moon Passage, near Hong Kong, China."—(W. Stimpson.)

"Yellowish, spines dark olive. In 25 f., among clean stones and nullipores off the headland of Hakodadi, Isl. of Jesso, and N. E. end of Niphon."—(W. Stimpson.)

TOXOCIDARIS GLOBULOSA A. Ag.

Primary and secondary tubercles of the same size; outline globular; miliaries numerous; poriferous zone broad, increasing in breadth; pores arranged in arcs of 8 or 9 pairs, near the mouth; spines of dried specimens dark violet, short and slender.

"Keelung, Formosa."—(W. Stimpson.)

TOXOCIDARIS DEPRESSA A. Ag.

Remarkable for its extreme flatness on the lower surface and the great depression of the polar diameter. Tubercles numerous, uniform in size; coronal plates long; spines slender, rather short, scarcely equalling in length one quarter of the diameter. Poriferous zone broad, as broad as the median ambulacral space; pores arranged in very slightly arched arcs of 6 to 7 pairs of pores.

"N. E. end of Niphon."—(W. Stimpson.)

PSAMMECHINUS SUBANGULOSUS Ag., Cat. Rais.

"Color reddish and brownish red of various shades. Very common in 4th l. and at l. w. m. on rocks, chiefly in crevices. Simon's Bay, Cape of Good Hope."—(W. Stimpson.)

PSAMMECHINUS INTERMEDIUS Barn. MS.

Coronal plates high; tubercles of interambulacral area of uniform size, arranged in ten vertical rows; in ambulacral space in four. Two vertical rows of small tubercles in poriferous zone. The third outside vertical row of pores very irregular, forming small arcs of two to three pairs of pores. Spines short and stout; ovarian openings large. Outline somewhat depressed; mouth opening small.

"Hakodadi Bay."

"Ousima."—(W. Stimpson.)

PSAMMECHINUS PULCHERRIMUS Barn. MS.

The tubercles are quite small, closely packed together, of uniform size, arranged in slightly bent horizontal rows, four to eight in each interambulacral plate, according to the position; large miliaries fill up the intermediate space between the horizontal rows. In the ambulacra there are three small tubercles on each plate, making thus horizontal rows of sixteen tubercles in the interambulacra and six in the ambulacra. The spines are very minute, slender and sharp. The test is thick; pores are arranged in oblique lines of four, and the rows are separated by small tubercles. Notches round the mouth very marked and deep for this genus.

"Color light olive, greenish above, brownish below. Found among stones and Laminariæ in ½ f. Hakodadi Bay."—(W. Stimpson.)

TOXOPNEUSTES DROBACHIENSIS Ag., Cat. Rais.

"Very common in 10 fathoms, gravel and muddy gravel. Seniavine Straits, W. shore of Behring's Straits."—(W. Stimpson.)

"Very common in 2 f. mud, off shingle beaches in Avatscha Bay, Kamtschatka."—(W. Stimpson.)

See my remarks about the geographical distribution of this species in Proc. Bost. Soc. N. H., vol. ix., p. 191.

TOXOPNEUSTES CARNOSUS Barn. MS.

This species is closely allied to *T. drobachiensis*, from which it is easily distinguished by the flesh color of its test and pink color of its spines. The pairs of pores are placed very close together, so that each arc is narrow, containing from 5 to 6 pairs. Two principal rows of tubercles with miliaries not numerous, but prominent, arranged in a circle round the primary tubercle. The spines are short and slender; the notches of the actinostome scarcely perceptible.

Dredged in Behring's Straits. Capt. Rodgers. Gulf of Penginsk, Ochotsck Sea; Capt. Stevens.

LOXECHINUS PURPURATUS A. Ag., Bull. Mus. Comp. Zool., 1863.

"Taken among rocks at l. w. m. near San Francisco, Cal., (Sir Francis Drake's Bay;) occasionally brought to market."—(W. Stimpson.)

SPHAERECHINUS BREVISPINOSUS Des. Syn., Echin. Foss.

"Taken by the natives by diving, in 2 f. rocks. Funchal Bay, Madeira."—(W. Stimpson.)

"A young specimen, probably. In 20 f. among nullipores. Porto Praya, Cape de Verdes Ids."—(W. Stimpsou.)

MICROCYPHUS ELEGANS A. Ag.

Remarkable for the great number of small tubercles scattered irregularly round the two principal vertical rows of interambulacral tubercles. Depressions at junctions of plates, with a tendency of running into one another, both in the ambulacral and interambulacral spaces. The space free from spines quite small, hardly more marked than in *Goniocidaris* in the interambulacral region; comparatively broad in the ambulacral region.

"In 25 f., coarse gravel and nullipores off the headland of Hakodadi, Island, Jesso, Japan."—(W. Stimpson.)

Toreumatica concava Gray, Proc. Zool. Soc. Lond. 1855.

"Common; found covering the bottom in some spots off the Coast of China, near Hong Kong, in 15—20 f., mud. Also found sparingly in the inner bays in 4 to 6 f."

"Cream colored, with five broad rays of purplish above."—(W. Stimpson.)

Temnopleurus Reevesii A. Ag., Bull. Mus. Comp. Zool., 1863.

"In 8 f., shelly ground, channel of Hong Kong harbor, China. Color pale yellowish or greenish yellow; spines annulated with dark violet."—(W. Stimpson.)

ANTHECHINUS A. Ag.

Small pentagonal sea-urchins, with prominent abactinal system and openings at angles of plates. The ambulacra convex, projecting beyond the level of interambulacral space, which is quite depressed. Median ambulacral and interambulacral space free from spines. The bare space follows the line of plates and is not sunken, as in *Microcyphus* and *Temnopleurus*, but slopes gradually to the edge of the plate. Tubercles very minute, somewhat larger round the mouth, where they are arranged in diverging rows, extending about half way to the abactinal area, while they are scattered irregularly on the portion of the plates, which they cover partially. Pores arranged in single pairs in a vertical row.

Anthechinus roseus A. Ag.

Genital plates perfectly smooth, with a large opening, like a notch, in the edge of the plate. Anal plates numerous, covered with minute spines. The bare space is violet in dry specimens and the spines are greenish. The spines are exceedingly slender and sharp, resembling those of *Salmacis*, though much smaller in proportion to the size of the sea-urchin. Polar diameter, as great as the transverse. "Japan."—(W. Stimpson.)

TEMNOTREMA A. Ag.

Small sea-urchin, almost globular, with marked grooves at the sutures of the plates, as in *Salmacis*. Two principal vertical rows of tubercles; smaller tubercles crowded irregularly over the rest of the plate. Abactinal system pentagonal, with prominent angles, the anal system consisting of four plates as in *Echinocidaris*. Spines like those of *Salmacis*, though finer in proportion and more deeply grooved. Pairs of pores arranged in a single vertical row.

Temnotrema sculpta A. Ag.

Test, mottled with white, violet and patche of brown, has a greenish tinge; spines of lower surface, near the mouth, much larger than those of the abactinal part of the test. Actinal system smooth, with the exception of ten large plates round the opening of the mouth; spines ringed with white and violet.

"Kagosima Bay, Japan."—(W. Stimpson.)

Hipponoe violacea A. Ag., Bull. Mus. Comp. Zool., 1863.

"Taken by the natives by diving at Hilo, Hawaii."—(W. Stimpson.)

Found under stones on gravelly bottom below l. w. m., especially among sea-weeds.

"Katawaisima Straits, Island of Ousima. Body purplish red; spines white."—(W. Stimpson.)

"Loo Choo Islands."—(W. Stimpson.) Fragments only.

Mespilia globulus Ag., Cat. Rais.

"Ousima, Japan."—(W. Stimpson.)

Two species of *Fibularia*, one from Kagosima and the other from the China Seas, too imperfect for description.

Echinocyamus tarentinus Ag., Cat. Rais.

"Taken in 15 f. sand. Funchal Bay, Madeira."—(W. Stimpson.)

Also a species of *Echinocyamus;* "taken in abundance in 5 f. sand. Kagosima Bay, Japan. Color waxen white."—W. Stimpson.)
"Ousima."—(W. Stimpson.)

ECHINOCYAMUS AUSTRALIS Ag., Cat. Rais.
"Coral Sea of Australia, Groper Shoal."—(W. Stimpson.)

A species of *Laganum* from the Loo Choo Islands, too imperfect for accurate description.

LAGANUM PUTNAMI Barn. MS.
Resembles *Lag. depressum*, Ag., in its general outline, but has, like *Lag. Peroni*, the genital opening far outside the rosette. The ambulacral rosettes are very pointed and slender. Anus nearer the edge than in other species of this genus; lower surface deeply grooved by the straight ambulacral furrows; mouth not sunken as in *Peroni*.
"Ousima."—(W. Stimpson.)

RUMPHIA LESUEURI A. Ag., Bull. Mus. Comp. Zool., 1863.
"Color pale red above, with five curves of paler color near edge of interambulacral spaces. Below, pale yellowish green. Abundant in 6—10 f. sandy mud among the Islands near Hong Kong, China."—(W. Stimpson.)

ECHINARACHNIUS ASIATICUS Mich , Rev. et Mag. Zool., 1859.
"Covers the coarse, black, sandy floor of the sea off the coast of Kamtschatka, near Petropaulski. Found at various depths from 30 to 70 fathoms; color reddish brown when alive."—(W. Stimpson.)

SCAPHECHINUS Barn. MS.

This genus is closely allied to *Echinarachnius*. It has, however, remarkable points of difference in the small number and great thickness of the walls joining the two floors, as well as in the mode of branching of the grooves on the lower surface, which is exactly that of the fossil genus *Scutella*. It has the ambulacral rosette of *Echinarachnius* and the depression of the interambulacral space on the upper surface of *Arachnoides*.

SCAPHECHINUS MIRABILIS Barn. MS.
Test depressed in interambulacral spaces; outline somewhat scolloped; genital openings outside of the pentagon of the centre of the rosette.
"Seined on sandy shores. The sandy bottom of Hakodadi Bay, (north side,) from l. w. m. to 1—2 f., is covered so closely with this species that no space of a square foot can be found free of them. In some places a boat-hook can not be thrust to the bottom without striking one. Color above deep purplish crimson, below light olive. The deep crimson pigment comes off easily and stains the hand. Hakodadi, Island of Jesso."—(W. Stimpson.)

Fragments of a new species of *Mellita* from the China Seas, in lat. 23°.

LOBOPHORA TEXTA A. Ag.
Resembles in outline the *L. truncata*, and would readily be referred to that genus from its general appearance. The position of the anus is also somewhat more marginal than in *L. bifissa*, being placed about opposite the middle of the lunule. On opening it we find that the lower floor is covered with a delicate grooved work, as in *Lobophora*, the grooves being mainly arranged on both sides of the ambulacral tubes, forming a beautifully carved elongated rosette round the mouth. We find nothing of this arrangement in *L. bifissa*. Lunules small, entirely closed, placed some distance from the margin. Teeth are much larger in proportion to the size of disk than in *Lobophora bifissa*.
"Dredged in 12 f. clean sand at Tanegasima, (Isl. south of Japan,) also in 10 f. sand off the east coast of Ousima. Color dark red, darkest below."—(W. Stimpson.)

A young specimen? was dredged in the China Sea in lat. 23°, in 20 f. sand.

ROTULA RUMPHII Kl.

A young specimen? "Taken in 20 f. nullipore bottom, Porto Praya, Cape de Verdes."—(W. Stimpson.)

A species of *Echinoneus*, not sufficiently well preserved to admit of determination, was taken at the Loo Choo Islands.

Fragments of a large *Spatangus* allied to *Sp. purpureus*, taken in 50 f. in the Straits of Sangar, on the steamer Hancock, Capt. Stevens.

MARETIA ALTA A. Ag.

Differs from the *M. planulata* Gray, by the great convexity of the abactinal region. The large spines are more slender and much less numerous on the abactinal portion of the test. The whole of this is covered with quite minute silk like bristles, while in the *M. planulata* many of the bristles are stout and nearly as long as the diameter of the test. The large tubercles are all limited to the lower portion of the interambulacral space except one or two, while in *M. planulata* the whole interambulacral space is covered with large tubercles.

"Of a light buff color, above radiated with rows of flesh-colored patches. Taken commonly in 5 f., black sand, in Kagosima Bay."—(W. Stimpson.)

LOVENIA SUBCARINATA Gray, Proc. Zool. Soc., Lond., 1855.

"In 10 f. mud off Tamtu Island, Coast of China, near Hong Kong. Small ones common in 5 f. mud in the inner bays; young of a pinkish and fawn color; adult clear dark brown."—(W. Stimpson.)

It seems to me very doubtful whether this species is a true Lovenia. It has characters which place it close to Breynia, while the pouches at the base of the large spines are similar to those of *Lovenia*. The pouches are much more limited in their position than in *Lovenia hystrix*.

LOVENIA TRIANGULARIS A. Ag.

This species is at once distinguished from either the *hystrix* or the California species of this same genus, by the great width of the anterior region and the position of the large tubercles crowded together close to the anterior ambulacra. The position of the mouth is more central than in other species of this genus.

"Dark reddish above, sometimes purplish; longer spines annulated with white and red; below, color much lighter. Dredged in 5 f., black sand, Kagosima Bay."—(W. Stimpson.)

LESKIA MIRABILIS Gray. Cat. Brit. Mus.

A single broken specimen of this interesting species. The posterior part, containing the pentagonal pyramid covering the opening of the anus, quite well preserved.

"In 20 f., mud near Gr. Lema, off Coast of China, near Hong Kong. Dead specimens show that it grows to a length of three inches. Of a pale straw color; feet blood-red, palish."—(W. Stimpson.)

ECHINOCARDIUM STIMPSONII A. Ag.

More elongated than *E. cordatum*, to which it is closely allied; easily recognized by the great slope of the anterior ambulacral region; tubercles of the oral surface distant, position of the genital openings nearer the centre than in the *E. cordatum* Gray; the posterior interambulacrum is not prominent.

"Taken in 10 f. sandy mud in Kagosima Bay, Japan. Color somewhat yellowish,—hay color."—(W. Stimpson.)

Another species of this genus, resembling *E. gibbosum*, was brought from the Cape of Good Hope; the specimens were probably only young.

"Of a small size; not uncommon in 12 f. sand, Simon's Bay, Cape of Good Hope. Color white, suckers red."—(W. Stimpson.)

Also a species of *Brissus* allied to the *Brissus carinatus* Lamk ,Gaspé Straits, collected by Capt. Rodgers, who states them to be very common on the beaches there.

The Reports of the Recording Secretary and of the Curators were read, as follow:

REPORT OF THE RECORDING SECRETARY,

For 1863.

During the year ending 30th November, 1863, there have been elected sixteen members and eight correspondents.

The following members have died: Mark W. Collet, M. D., John McCanless, John Y. Clark, M. D.. Edward Harris.

The death of the following Correspondents has been announced:

Samuel R. Wetherill, of Burlington, N. J.; Rev. James H. McFarland, U. S. Army; Dr. William Darlington, West Chester, Pa.; Prof. C. G. C. Reinhardt, Leyden; Benj. D. Green, of Boston, Mass.; Asahel Clapp, New Albany, Indiana; Charles W. Short, M. D., Louisville, Ky.; S. P. Hildreth, M. D., Marietta, Ohio; Ebenezer Emmons, of North Carolina; Chevalier A. C. Bernardi, of Paris.

One member has resigned.

The number of papers contributed and ordered to be published during the same time, has been sixty-eight, as follows:

By Theodore Gill, twenty-four; George W. Tryon, Jr., eight; Isaac Lea, LL.D., seven; John Cassin, four; Elliott Coues, M. D., U. S. A., three; Messrs. T. A. Conrad, James Lewis, M. D., E. D. Cope, Jacob Ennis, W. T. March and S. F. Baird, each two; Charles C. Abbott, Alexander Winchell, E. Durand, Samuel Ashmead and Thomas P. James, Asa Gray, James A. Grant, M. D., George N. Lawrence, Horatio C. Wood, M. D., Wm. Stimpson, Thomas B. Wilson, M. D., and John Cassin, Robert Kennicott, Felipe Poey and J. C. Brevoort, J. C. Brevoort and S. S. Haldeman, each one.

All of which is respectfully submitted.

B. HOWARD RAND, M. D.,
Recording Secretary.

REPORT OF CURATORS.

For 1863.

The Curators announce the following list of donations of objects of natural history to the Academy during the year just closing.

Mammals.—Of these 6 species were presented by Drs. Jos. C. Martindale, and James A. Grant, Mr. Matson and Mr. Foulke. Dr. I. I. Hayes also presented a fine mounted specimen of the Esquimaux dog of pure breed.

Birds.—Mr. B. F. Saurmann presented 80 mounted specimens of 52 species of American birds, and Dr. Jos. C. Martindale, mounted specimens of 22 species. Seven specimens were also presented by John Krider, T. Beesley, Gen. Pleasantson and others.

Reptiles.—The Smithsonian Institution presented 150 specimens of 95 species of North American serpents, many of them types of Baird and Girard. A collection of reptiles from Hilton Head, S. C., was presented by

Dr. J. J. Craven. Several others were presented by Dr. J. C. Fisher, C. Guillou and J. Warner.

Fishes.—Small collections were presented by Dr. J. J. Craven and S. Powel, and 14 species by the Rev. James A. Mackay, S. Ashmead and E. D. Cope.

Mollusks.—Mr. Geo. W. Tryon, jr., presented 198 species of land and fresh water shells, Mr. I. Lea 52 species, and the Smithsonian Institution 39 species. Small collections of shells were presented by Dr. J. J. Craven, John Warner and the late Mrs. Hannah I. Davenport, and several species by Rev. E. R. Beadle, Dr. A. A. Gould, Prof. Haldeman and Prof. Porter.

Articulates.—Specimens of crustacea, insects, myriapods, scorpions, spiders and worms, were presented by Drs. J. J. Craven, J. C. Fisher, J. L. Le Conte, and J. C. Cleburne, Messrs. J. Hobbs, C. Guillou and Freeman, and the Smithsonian Institution.

Fossils.—Small collections were presented by Drs. J. C. Morris, H. C. Wood, Jr., W. F. Atlee and Mr. A. L. Gerhart. Twenty-two specimens were presented by P. W. Sheafer, Dr. J. M. Corse, T. Beesley, W. S. Vaux, E. Nolan, H. S. Bender, G. J. Scattergood and J. E. Painter. A fine specimen of the great trilobite, Isoteles magistus, was also presented by E. S. Wayne.

Minerals.—A collection of 250 minerals, many of them valuable additions to our cabinet, were presented by the late J. P. W. Neff. Ninety others were presented by C. U. Shepard, J. F. Parker, E. H. Beebe, I. Lea, J. C. Fisher, Mrs. H. I. Davenport, T. D. Rand, J. E. Painter, J. C. Trautwine and R. Bridges.

Miscellaneous.—Specimens of shells, plaster casts, bones, plants, Indian antiques, etc., were presented or obtained in exchange, 110 in number, from C. A. Poulson, B. R. Ross, C. C. Abbott, Mrs. Jacob Green, Mrs. Hannah I. Davenport, E. J. De Haven, J. G. Eastlack, J. F. Parker, R. Bingham, Dr. R. Jennings, Dr. Le Conte, A. Fiot and Mr. Ward.

Respectfully submitted by

JOSEPH LEIDY,
Chairman of the Curators.

The Treasurer read his annual Report, which was referred to the Auditors.

The Reports of the Librarian, Committees on Proceedings and Publication Committee were deferred until the next meeting for business.

The President, Mr. Lea, declined being a candidate for re-election to that office.

The election of officers for the ensuing year was held, and the following gentlemen were unanimously elected.

President.....THOMAS B. WILSON, M. D.

Vice-Presidents.....Robert Bridges, M. D.
Wm. S. Vaux.

Corresponding Secretary.....Thomas Stewardson, M. D.

Recording Secretary.....B. Howard Rand, M. D.

Librarian.....J. D. Sergeant.

Treasurer.....Wm. C. Henszey.

Curators.....Joseph Leidy, M. D.
Wm. S. Vaux,
John Cassin,
J. D. Sergeant.

[Dec.

Auditors.....Wm. S. Vaux,
Joseph Jeanes,
Aubrey H. Smith.

Publication Committee.....Wm. S. Vaux,
Isaac Lea,
Robert Bridges, M. D.
Joseph Leidy, M. D.
Thomas Stewardson, M. D.

ELECTIONS FOR 1863.

The following persons were elected Members,—viz :

Jan. 27.—Andrew H. Smith, M.D., U.S.A., Jos. C. Martindale, M.D., Benj. F. Saurman.

Feb. 24.—J. Hampden Porter, M. D., J. Dutton Steele, of Pottstown, Pa.; W. Lorenz, of Lebanon, Pa.; J. Frank Knight.

March 31.—James Milliken.

May 26.—Harry C. Yarrow, M. D.

June 30.—W. Lehman Wells, M. D., Jas. Hepburn, of San Franco, Cal.

July 28.—W. S. King, M. D., U. S. A., Edw. Curtis, U. S. A

Aug. 25.—Geo. J. Scattergood.

Oct. 27.—Wm. M. King, M. D., U. S. N., Wm. Furness Jenks.

Dec. 29.—Geo. T. Lewis, Wm. J. Horstmann.

The following persons were elected Correspondents :

Jan. 27.—Sidney S. Lyon, Jeffersonville, Ind.

March 31.—Hon. Henry Winter Davis, Baltimore, Md.

April 28.—Hon. L. E. Chittenden, Washington, D. C.; James A. Grant, M. D., Ottowa, Canada.

May 26.—Hon. F. E. Spinner, Washington, D. C.; I. I. Craven, M. D., U. S. A.

Aug. 25.—Auguste Rémond, of San Francisco, Cal.

Oct. 27.—Edw. H. Beebe, Galena, Ill.

Dec. 29.—Giovanni Capellini, Bologna.

CORRESPONDENCE OF THE ACADEMY.

For 1863.

Letters were received and read as follows:

Feb. 3*d.* Prof. C. H. Hitchcock, Amherst, Mass., 15th Jan., 1863, desiring exchange;

Société de Biologie, of Paris, 10th Sept., 1862, transmitting its publications and noting deficiencies in those of the Academy;

Bernard R. Ross, Croaghmore House, Red River Settlement, 12th Dec., 1862, acknowledging his election as correspondent, and advising of donation.

Provincial Society of Sciences, Utrecht, 1862;

British Museum, 20th Nov., 1862;

Royal Asiatic Soc., London, July, 1862;

Imperial Society of Sciences, Cherbourg, Dec., 1861;

Royal Academy of Sciences, Madrid, 11th Dec., 1862;

Lyceum of Natural History, New York, 5th Jan., 1862;

Natural History Society of Dantzig, 10th June, 1862;

Bergen Museum, 25th Feb., 1862;

Royal Saxon Society of Sciences, Leipzig, 15th Aug., 1862;

Natural History Society, Emden, 17th Feb., 1862; severally acknowledging the receipt of the publications of the Academy.

Natural History Society of Görlitz, 27th April, 1861;

Jablonowsky Society, Leipzig, 25th September, 1862;

Natural History Society, Dorpat, 30th May, 1862;

Royal Prussian Academy of Sciences, 15th Aug., 1862;

Imperial Society of Naturalists of Moscow, 16th June, 1862;

Royal Saxon Society of Sciences, Leipsig, 15th Aug., 1862;

Mineralogical Society of St. Petersburg, 10th Sept., 1862;

Royal Physico-Economical Society, Konigsburg, 3d May, 1861;

Hungarian Academy of Sciences, Pesth, 15th Dec., 1862;

Imperial Leopoldine-Carolinian Society, Jena, 18th May, 1861; severally transmitting their publications.

Natural History Society, Dantzig, June 19, 1861.

Natural History Society, Halle, Aug. 16, 1862;

Natural History Society, Altenburg, April 25, 1861;

Society of Natural Sciences, Meissen, Nov. 5th, 1862; severally transmitting their publications and acknowledging the receipt of those of the Academy.

Feb. 10*th.* Andrew H. Smith, M. D., Philadelphia, Feb. 6th, 1863; acknowledging his election to membership.

March 3*d.* J. Hampden Porter, M. D., Philadelphia, Feb. 27, 1863; acknowledging his election to membership.

March 10*th.* Wm. Lorenz, Lebanon, Pa., 28th Feb., 1863, acknowledging his election to membership.

New York State Library, Albany, 6th Mar., 1863;

Chicago Hist. Soc., 28th Feb., 1863;

Liverpool Literary and Phil. Soc., Apr. 22, 1862; severally acknowledging the receipt of the publications of the Academy.

Geological Survey of India, April and July, 1862; transmitting its publications.

March 17*th.* J. Dutton Steele, Pottstown, Pa., March 14th, 1863, acknowledging his election to membership.

The Literary and Philos. Soc. of Quebec, April 8th, 1863;
California Acad. Nat. Sciences, Nov. 1st, 1862;
Imperial Geol. Institute, Vienna, Sept. 29th, 1862;
German Geol. Soc., Berlin, Nov. 6th, 1862;
Royal Soc. of Ediuburgh, Nov. 1st, 1862;
Natural Hist. Soc. of Nuremburg, June 10th, 1862; severally acknowledging the receipt of the publications of the Academy.
Imperial Jablonowsky Soc., Leipzig, Jan. 6th, 1863; transmittiug its publications.
Natural History Soc. of the Duchy of Nassau, Jan. 11th, 1863;
Society of Physics and Natural History, Geneva, Nov. 1, 1862.
Royal Soc. of Sciences of Upsal, Sept. 15th, 1862;
Natural History Soc. of Wurtemburg, Oct. 18th, 1862; severally transmitting their publications and acknowledging the receipt of those of the Academy.

May 19th. Royal Bavarian Academy of Sciences, Nov. 6th, 1862;
Zoological Society, Frankfort A. M., Jan. 8th, 1863;
Society of Arts and Sciences, Utrecht, Oct., 1862;
Natural History Society of Dantzig, Dec. 2d, 1862;
Academy of Sciences, Paris, Oct. 20th, 1862;
Imperial Academy of Sciences, Vienna, Nov. 10th, 1862;
Imperial Leopoldine-Carolinian Academy, Jena, Oct. 18, 1862;
Society of the Friends of Natural History, Mecklenburg, Oct. 2d, 1862;
Natural History Society, Basel, Oct. 23d, 1862;
Smithsonian Institution, May 27th, August 16th and Dec. 1st, 1862;
Royal University Society of Gottiugen, Dec. 18th, 1862;
Atheneum, London, April 4th, 1863;
Batavian Society of Sciences, Rotterdam, Jan. 21st, 1862; severally acknowledging the receipt of the publications of the Academy.

June 2d. Presbyterian General Assembly, May 2d, 1863; acknowledging an invitation to visit the Museum of the Academy.
Sydney S. Lyon, May, 1863; acknowledging his election as correspondent.
Smithsoniau Institution, May 28th, 1863; accompanying a donation.

June 9th. New York State Library, June 6th, 1863; acknowledging the receipt of the publications of the Academy.

June 16th. British Museum, May 21st, 1863; acknowledging the receipt of the publications of the Academy.

July 7th. Dr. J. J. Craveu, Hilton Head, S. C., June, 1863; acknowledging his election.
Hydrographic Bureau of the Royal Marines, Trieste, April, 1863; transmitting a douation.

Sept. 1st. Mr. Ralph Taylor, Executor of Mrs. Hannah Israel Davenport, Philad., Aug. 27th, 1863, accompanying a donation.

Sept. 15th. Edward Curtis, Washington, D. C., Sept. 8th, 1863; acknowledgiug his election to membership.
James S. Graut, M. D., Ottawa, Canada, Aug. 31st, 1863; acknowledging his election as correspondent.

Sept. 22d. New York State Library, Albany, July 11th, 1863;
Geological Society, London, April 22d, 1863;
British Museum, July 23d, 1863;
Imperial Society of Naturalists, Moscow, April 22d, 1863;
Society Naturalists, Moscow, April 22, 1863;
Society Naturalists, Neufchatel, Dec. 31st, 1862;
Natural History Society, Hanover, May 1st, 1863;

Society of Natural History, Görlitz, March 16th, 1863; severally acknowledging the receipt of the publications of the Academy.

The Royal Bohemian Society of Sciences, April 5th and 16th, 1863; transmitting its publications and acknowledging the receipt of those of the Academy.

Anthropological Society, London, June 29th, 1863;

Natural History Society, Dublin, Aug. 5th, 1853; proposing exchange of publications;

Wm. H DeCamp, M. D., Elk River Bridge, Tenn.; acknowledging his election as correspondent.

Oct. 13th. Linnæan Society, London, July 29th, 1863; acknowledging the receipt of the Journal and Proceedings of the Academy.

Nov. 10th. Imperial Society of Naturalists, Moscow, June 13th, 1863;

Society of Natural Sciences, Riga, April 15th, 1863; both accompanying their publications.

Royal Society, London, Aug. 13th, 1863; acknowledging the receipt of the publications of the Academy.

Royal Danish Society, Copenhagen, Feb. 1st, 1863; acknowledging the receipt of the publications of the Academy, and accompanying those of the Society.

The Royal Society of Sciences of Liege, May 19th, 1863; acknowledging the receipt of the publication of the Academy, and requesting a supply of deficiencies.

The Silesian Institution for the instruction of the blind, Breslau, Nov. 1st, 1862; acknowledging the receipt of the publications of the Academy.

Dec. 8th. The Catholic Society, Louvain, 18th Dec., 1862;

Geological Society of India, 13th October, 1862;

Imperial Academy of Sciences, Vienna, Jan. 24, 1863;

Medical Association, Frankfort A. M., 1863;

Royal Society of Sciences, Amsterdam, Oct. 23, 1862;

Natural History Society, Halle, 10th March, 1863; severally accompanying donations to the library.

The Senckenberg Natural History Society, Frankfort A. M., 3d January, 1863.

Natural History Society, Augsburg, 3d January, 1863;

Royal Society of Sciences, Amsterdam, 25th Oct., 1862;

Natural History Society of Prussian Rhineland and Westphalia, 17th Jan., 1863; severally acknowledging the receipt of the publications of the Academy.

The Royal Society of Sciences of Gottingen, 7th May, 1863;

Physico-Medical Society of Wurzburg, Jan. 6, 1862;

Natural History Society of Alterburg, 19th March, 1863; severally transmitting their publications and acknowledging the receipt of those of the Academy.

Dec. 15th. A letter was read from J. H. Norris, addressed to the President, asking, at the request of the Austrian Consul General, a donation from the Academy of an Indian skull, for an Austrian savant.

Dec. 22d. Natural History Society of Altenburg, 16th June, 1863, acknowledging the receipt of the publications of the Academy.

DONATIONS TO THE MUSEUM.

1863.

Abbott, C. C. *Sept.* 8*th.* Numerous lance-heads of Yellow Jasper and a mass of the same. Indian Antiquities. Found in a meadow, 3 miles South of Trenton, N. J.

Ashmead, Sam'l. *Jan.* 6*th.* Five species of Fishes. Beesley's Point, N. J.

Beadle, Rev. E. R. *March* 10*th.* Monocondylœa rhomboidea, Lea, and Unio Hueti, Bourquinat. From the river Tigris, near Bagdad, Assyria.

Beebe, Edw. H. *Sept.* 8*th.* Thirty specimens of fibrous Galena, Blende, and iron Pyrites, from Galena, Ill. Specimens of Lingula, Wisconsin, and Carbonate of Zinc.

Beesley, Thos. *March* 24*th.* Larus Bonapartei, young, from Cape May, N. J.

Bender, H. S. *Apr.* 7*th.* Three Fossil Shells, from near Acquia Creek, Va.

Bingham, R. *Mar.* 24*th* Fragment of Ship Timber pierced by Teredo.

Cleborne, Dr. J. C. *Oct.* 6*th.* A large Marine Annelide, from Mobile Bay.

Cope, E. D. *March* 31*st.* Large Lepidosteus, caught in the Delaware. Deposited.

Craven, Dr. J. J. *Nov.* 3*d.* A collection of Fishes, Reptiles, Mollusks and Insects, from Hilton Head, S. C.

Davenport, Mrs. H. I. *Sept.* 1*st.* A small collection of Marine Shells, Minerals, polished specimens of fossil Antigua Wood, Sea Weeds and specimens of Indian Art. A legacy to the Academy.

DeHaven, E. S. *July* 14*th.* An Indian Stone Hoe. Found near Camden, N. J.

Destouet, J. E. *Oct.* 13*th.* Aleatra cuspicauda.

Eastlack, J. G. *Sept.* 8*th.* A Stone Axe, and a collection of Arrow-heads. From Mt. Ephraim, Camden Co., N. J.

Fisher, Dr. J. C. *Sept.* 1*st.* Specimens of Rock Salt, from the mine of Petite Anse, New Iberia, La., presented by Dr. Fisher and S. Hotaling. Two bottles containing Reptiles and Crustaceans. From Springfield Landing, Louisiana.

Freeman, Mr. *June* 16*th.* Elater noctilucus, Cuba.

Gabb, Wm. M. *March* 3*d.* Four small Crustacea, from San Francisco Bay.

Gould, Dr. A. A. *Nov.* 10*th.* Six species of Pleurocera.

Grant. Dr. J. A. *March* 24*th.* Lagopus albus, ♂ and ♀, from Ottawa, Ca.

Green, Prof. J. *June* 1*st.* Two volumes of the Herbarium of the late Prof. Green, presented by his widow through W. L. Mactier.

Guillou, C. *June* 2*d.* A collection of Spiders, Myriapods and a Lizard, from Cuba.

Hayes, Dr. I. I. *Sept.* 1*st.* Mounted specimen of an Esquimaux Dog.

Hobbs, J. *Jan* 6*th.* Four King-crabs, from New Hampshire.

Jennings, Dr. R. *March* 24*th.* Portions of the coats of the Aorta, with specimens of Sclerostomum armatum.

Krider, J. *Mar.* 24*th.* Alca torda, winter plumage, from Rhode Island. *Apr.* 7*th.* Eight Fossil Shells, from Cape May Co., N. J. *Apr.* 14*th.* Mounted specimens of Harelda glacialis, adult, and Colymbus septentrionalis, young.

Lea, Isaac. *Apr.* 7*th.* Six species of Schizostoma, Coosa River, Alabama. *May.* Acicular tourmaline and green felspar. Anodonta Simpsoniana, Unio luteolus, and Trypanostoma canalitium, Massive Garnet and Asbestus, with Clinochlore. Twelve species of Melanidæ, from Ohio, Alabama and Tennessee. *June* 2*d.* Beryl, Green Quartz and Black Actynolite, Del. Co., Pa. *June* 9*th.* Graphic Granite and Ilmenite. *June* 16*th.* Green Chlorite with dendritic marks, and Amianthus, Del. Co., Pa. *Aug.* 18*th*

Unio Osbeckii. *Nov.* 17*th.* Three crystalline Slags, from an iron furnace.

Le Conte, Dr. J. L. *Nov.* 3*d.* A collection of Insects in copal, Skulls of Bats, Mice, &c. *Nov.* 17*th.* A bottle of Shrimps, from the Mississippi River, opposite Vicksburg.

Mackay, Rev. J. A. *Mar.* 10*th.* Eight species of Fishes, Island of Corisco, W. Africa.

Martindale, Dr. J. C. *Apr.* 14*th.* Twenty-two species mounted Birds and two species Mammals.

Matson, Mr. *March* 3*d.* An Albino Mole.

Morris, Dr. G. J. *May.* A collection of Coal Fossils.

Neff, J. P. W. *Oct.* 6*th.* A collection of two hundred and fifty Minerals, several Fossils and Shells.

Nolan, E. J. *March* 24*th.* Tooth of a Fossil Ray, from Acquia Creek, Va.

Painter, J. E. *Dec.* 1*st.* Specimens of Allanite and a small collection of Fossils.

Parker, J. F. *May.* Mica, Phrenite, Beryl, Garnet, Tourmaline, from near Middletown, Con. Also, the Sword of a large Sword-fish, Nantucket Shoals.

Pleasantson, Gen. A. J. *Jan.* 6*th.* A Snow Owl, from the vicinity of Philadelphia.

Porter, Prof. *Sept.* 8*th.* Numerous specimens of Amnicola Nickliniana, Huntingdon Co., Pa.

Poulson, Chas. A. *Feb.* 10*th.* Two Hindu Skulls, one Peruvian and one unknown.

Powel S. *Nov.* 10*th.* A collection of Fishes from Rhode Island.

Rand, T. D. *Sept.* 8*th.* Uranite, Muscovite and Biotite, and Vermiculite. From Philad., and Chester Co.

Ross, B. R. *Apr.* 14*th.* Two Tattit-Kootchin Skulls.

Saurman, B. F. *Jan.* 20*th.* A collection consisting of 85 specimens of 51 species of Mounted Birds. *May.* Mounted specimen of Bald Eagle, from near Philadelphia.

Scattergood, G. J. Fossil vertebra of a Shark, from the Green Sand, near White Horse, N. J.

Sheafer, P. W. *Mar.* 17*th.* A large and remarkably fine specimen of a Coal Plant, from the Mammoth Coal bed of the Swatara Co. *Apr.* 7*th.* Silex in Anthracite, and three species of Coal Plants.

Shepard, Prof. C. U. *Mar.* 3*d.* Twenty specimens of Minerals.

Smithsonian Inst. *March* 31*st.* 150 specimens, 95 species of Serpents, of North America, among which are types of Baird and Girard. *Nov.* 10*th.* 14 species of Pleurocera.

Tryon, G. W., Jr. *May.* Fifty species of Helix. *June* 9*th.* Seventy-five species of land and fresh-water Shells. *Aug.* 18*th.* Sixty species terrestrial mollusca, not previously in the Academy's collection. *Nov.* 10*th.* Three species of Pleurocera.

Vaux, Wm. S. *Feb.* 17*th.* Three human bones, semi-fossilized, from Ohio. *March* 24*th.* Two vertebræ of a Mastodon, and two of a Fossil Ox, from Ohio.

Ward, Prof. *Feb.* 10*th.* A collection of 18 casts in plaster, of vertebrate remains. In exchange.

Warner, J. *Jan.* 6*th.* Two Salamanders, 3 species of Terrestial Mollusks and several Limaces, from Germany.

Wayne, E. S. *Nov.* 3*d.* Isoteles Magistus, Cincinnati, Ohio.

Wood, Dr. H. C., Jr. *June* 2*d.* A collection of Fossils, consisting of Turtle and Cetacean Bones, from the Shiloh marl-pits, Cumberland Co., N. J.

DONATIONS TO THE LIBRARY.

1863.

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Upsala. Nova Acta Regiæ Societatis Scientiarum Upsaliensis. Seriei Tertiæ, vol. 4, Fasc. 1. From the Society.

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Copenhagen. Oversigt over det Kongelige danske Videnskabernes Selskabs Forhandlinger og dets Medlemmers Arbeider i Aaret, 1861. From the Society.

NORWAY.

Christiana. Meteorologische Beobachtungen. Liefs. i. and ii. From the Royal University of Sweden.

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Moscow. Bulletin de la Société Impériale des Naturalistes de Moscou. Année 1861, Nos. 2—4 1862, Nos. 1—4. From the Society.

Riga. Correspondenzblatt des Naturforschenden Vereins zu Riga, 13er Jahrg. From the Society.

St. Petersburg. Bulletin de l'Academie Impériale des Sciences de St. Petersburg. Tome 4. From the Academy.

Mémoires of the same, tome 4, Nos. 1—9. From the Academy.

Verhandlungen der Kaiserlichen Gesellschaft für die Gesamte Mineralogie zu St. Petersburg. Jahrgang, 1862. From the Society.

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Amsterdam. Verslagen en Medeelingen der K. Akademie van Wetenschappen. Dertiende deel. From the Society.

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GERMANY.

Altenburg. Mittheilungen aus dem Osterlande. Fünfzehnter Band, Erstes und Zweites Heft, 1860. From the Natural History Society of Altenburg.

Augsburg. Fünfzehnter Bericht des Naturhistorischen Vereins in Augsburg. 1863. From the Society.

Berlin. Mathematische Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin. 1861. From the Academy.

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Monatsberichte der K P. Akad. der Wissen. 1862. From the Society.

Bonn. Verhandlungen der Naturhistorischen Vereines der Prens. Rheinlande und Westphalens. 19er Jahrg. 1e und 2e Hälfter. From the Society.

Cassel. Malakozoologische Blätter. Bogen 12 to 15. From the Maclure Fund.

Danzig. Neueste Schriften der Naturforschenden Gesellschaft in Danzig. Sechsten Bandes, Zweites und Drittes Heft. From the Society.

Darmstadt. Notizblatt des Vereins für Erdkunde und verwandte Wissenschaften zu Darmstadt. 3 Folge, 1 Heft. 1—12. From the Society.

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Dresden. Sitzungs-Berichte der Naturwissenschaftlichen Gesellschaft Isis zu Dresden. Jahrg., 1861. From the Society.

Emden. Siebenundvierzigster Jahresbericht der Naturforschenden Gesellschaft in Emden. 1861. From the Society.

Frankfurt-am-Main. Der Zoologische Garten. 3es Jahrg., No. 7 to 4es Jahrg. No. 6. From the Editor.

Abhandlungen; herausgegeben von dem Senckenbergischen Naturforschenden Gesellschaft. Vierten Bandes, 2e Lief. From the Society.

Jahresbericht neber die Verwaltung des Medicinalwesens. 4 Jahrg., 1860. From the Society.

Giessen. Untersuchungen zur Naturlehre des Menschen und der Thiere. 9er Band, Erstes Heft. From the Library Fund.

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Göttingen. Nachrichten von der Georg-Augusts-Universität und der K. Gesellschaft der Wissenschaften zu Göttingen. 1862. From the Society.

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Hannover. Zwölfter Jahresberichte der Naturhistorischen Gesellschaft zu Hannover. 1863. From the Society.

Jena. Novorum Actorum Academiæ Cæsaræ Leopoldino-Carolinæ Germanicæ Naturæ Curiosorum. Tome 28. From the Society.

Konigsberg. Schrifter der Königlichen Physikalisch-Oekonomischen Gesellschaft zu Konigsberg. Erster Jahrg. 2e Abth., 3er Jahrg., 1e and 2e Abth. From the Society.

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Bericht neber die Verhandlungen der K. Sachsischen Gesellschaft der Wissenschaften zu Leipzig. 1861, 1 and 2. From the Society.

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Annalen der K. Sternwarte bei München. Band 9. From the Society.

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Offenbach-am-Main. Dritter Bericht des Offenbacher Vereins für Naturkunde ueber seine Thätigkeit. 1862. From the Society.

Prague. Sitzungsberichte der Konigl. Böhmischen Gesellschaft der Wissenschaften in Prague. Jahrg. 1862. From the Society.

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Regensburg. Correspondenz-Blatt des Zoologische-Mineralogische Vereins in Regensburg. 16er Jahrg., 1862. From the Society.

Stettin. Entomologische Zeitung. Herausgegeben von dem Entomologische Zeitung zu Stettin. 23er Jahrg., 1862. From the Society.

St. Gallen. Bericht ueber die Thätigkeit der St. Gallischen Naturwissenschaftlichen Gesellschaft. 1861—62. From the Society.

Stuttgart. Neues Jahrbuch für Mineralogie, Geognosie, Geologie und Petrefaktenkunde. Jahrg. 1862, 3es to 7es Heftes and 1863, 3es Heft. From the Editors.

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Vienna. Verhandlungen der Kaiserlich-Königlichen Zoologisch-botanischen Gesellschaft in Wien. Jahrg. 1861, Band 9. 1862, Band 12. From the Society.

Wiener Entomologische Monatschrift. 6 Band, No. 12, to 7 Band, No. 5. From the Editors.

Jahrbuch der K. K. Geologischen Reichsanstalt. 1861, 1862 and 1863. 12 Band, No. 4. From the Society.

General Register of the same, from No. 1, 1850 to No. 10, 1859. From the Society.

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Mémoires de la Société de Physique et d'Histoire Naturelle de Geneve. Tome 16. Seconde Partie. From the Society.

Lausanne. Bulletin de la Société Vaudoise des Sciences Naturelles. Tome 7, No. 49. From the Society.

Neuchatel. Bulletin de la Société des Sciences Naturelles de Neuchatel. Tome 6. Premier Cahier, 1862. From the Society.

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Bruxelles Annuaire de l'Academie Royale des Sciences, &c. 1863. 29me Année. From the Academy.

Mémoires Couronnés et Autres Mémoires of the same. Col. in 8me. Tomes 13 and 14. Bruxelles, 1862. From the Academy.

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Dijon. Mémoires de l'Academie Impériale des Sciences, &c. de Dijon. 2me Série, Tome 9me.

Luxembourg. Société des Sciences Naturelles de Grand-Duché de Luxembourg. Tome 5me. 1862. From the Society.

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Revue et Magasin de Zoologie pure et Appliquée. 1862, No. 11 to 1863, No. 9. From the Library Fund.

Mémoires de la Société Impériale des Sciences Naturelles de Cherburg. Tome 8. From the Society.

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Bulletin Mensuel de la Société Impériale Zoologique d'Acclimatation. Tome 9, No. 9, to Tome 10, No. 10. From Dr. Wilson on the usual conditions.

Annuaire of the same. 1863. From Dr. Wilson on the usual conditions.

Comptes Rendus des Séances et Mémoires de la Société de Biologie. Tome 3me de la 3me Série. Année, 1861. From the Society.

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Annales des Mines. Sixième Série. Tome 1, 3e liv. to Tome 3, 3e liv. 1863. From the Minister of Public Works, France.

Strasbourg. Mémoires de la Société des Sciences Naturelles de Strasbourg. Tome 5me, 2e and 3e livr. From the Society.

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Naples. Annali dell' Accademia degli Aspiranti Naturalisti. Terza Serie. Vol. 2. From the Academy.

GREAT BRITAIN AND IRELAND.

Dublin. The Transactions of the Royal Irish Academy. Vol. 24, pt. 2. From the Society.

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Transactions of the Botanical Society. Vol. 7, part 3. From the Society.

Liverpool. Proceedings of the Literary and Philosophical Society of Liverpool. No. 16. From the Society.

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The Annals and Magazine of Natural History. Nos. 49 to 71. From the Maclure Fund.

Proceedings of the Royal Horticultural Society. From vol. 2, No. 4 to vol. 3, No. 7. From the Society.

Journal of the Royal Asiatic Society of Great Britain and Ireland. Vol. 19, part 3, to vol. 20, pt. 2. From the Society.

The Athenæum. Parts 419 to 429. From Dr. Wilson, on the usual conditions.

Proceedings of the Royal Society. Vol. 2, No. 10 to 57. From the Society.

The Quarterly Journal of the Geological Society. Vol. 18, pt. 4 to vol. 19, pt. 3. From the Society.

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A Classified Index to the Transactions, Proceedings and Quarterly Journal of the same. From the same.

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Albany. Thirteenth, Fourteenth and Fifteenth Annual Reports of the Regents of the University of the State of New York. From James Hall.

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Bulletin of the New York Academy of Medicine. Vol. 2, Nos. 1—4. From the Academy.

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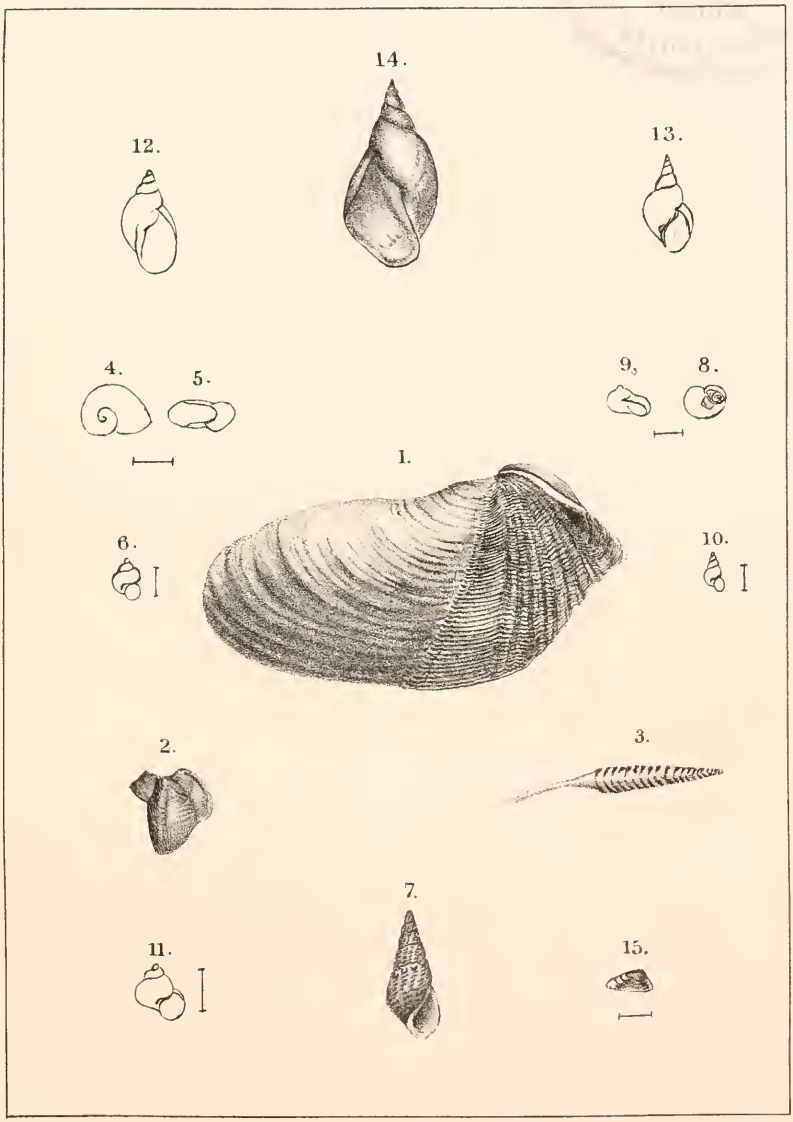

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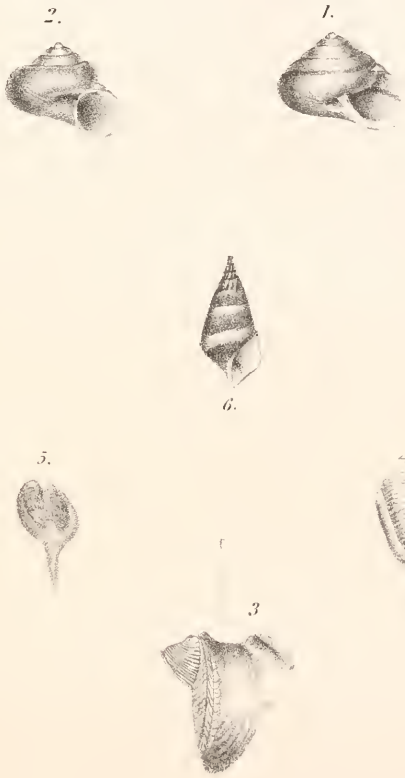

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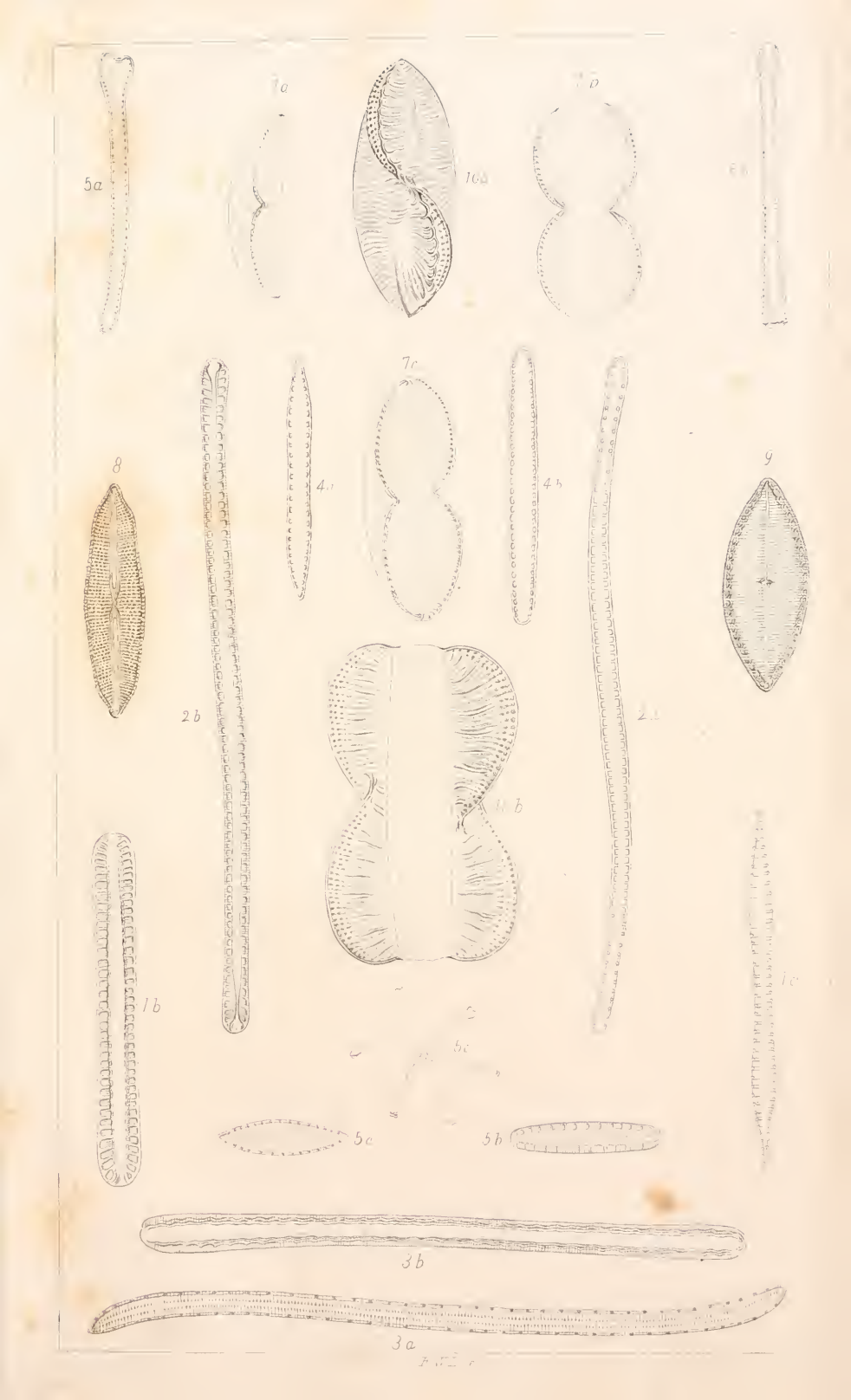
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