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SYNOPSIS OF THE FAMILY VENERIDÆ AND OF THE NORTH AMERICAN RECENT SPECIES.

BY

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Honorary Curator, Division of Mollusks.

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SYNOPSIS OF THE FAMILY VENERIDÆ AND OF THE NORTH AMERICAN RECENT SPECIES.

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This synopsis is one of a series of similar summaries of the families of bivalve mollusks which have been prepared by the writer in the course of a revision of our Pelecypod fauna in the light of the material accumulated in the collections of the United States National Museum. While the lists of species are made as complete as possible, for the coasts of the United States, the list of those ascribed to the Antilles, Central and South America, is probably subject to considerable additions when the fauna of these regions is better known and the literature more thoroughly sifted. No claim of completeness is therefore made for this portion of the work, except when so expressly stated. So many of the southern forms extend to the verge of our territory that it was thought well to include those known to exist in the vicinity when it could be done without too greatly increasing the labor involved in the known North American list.

The publications of authors included in the bibliography which follows are referred to by date in the text, but it may be said that the full explanation of changes made and decisions as to nomenclature arrived at is included in the memoir on the Tertiary fauna of Florida in course of publication by the Wagner Institute, of Philadelphia, for the writer, forming the third volume of their transactions. The rules of nomenclature cited in Part III of that work (pp. 561–565) are those upon which this revision has been founded, and are believed to express the opinions of the majority of those who have given thorough study to the subject of nomenclature. Authors who do not accept the British Association rules, as thus developed, can not expect to find their personal views reflected in this revision.

It may be thought that the subdivision of groups has been carried farther than desirable, to which the writer can only reply that in tracing the genealogy of our recent species through the Tertiary,

from horizon to horizon, he has found the minor divisions of very great assistance, the more thorough scrutiny and study which they naturally require, and which is irksome to superficial students, being essential to really thorough work in paleontology, and no small help in handling the recent forms. On the other hand, those whose studies do not require this insistence on apparently minor characteristics do not need to use the sectional names, and may easily fall back on those names by which the larger groups are called.

The family Veneridæ represents the culmination of Pelecypod evolution, so far as this may be represented by any single family. In beauty of color and delicacy of color pattern, in multiplicity and variety of sculptural developments, in wide distribution and bathymetric range, the Veneridæ equal if they do not surpass any other Teleodont group. While the shells are often exquisitely beautiful, the coloration and appendages of the soft parts are also frequently similarly attractive, leading to wonder why parts which are always covered by the mud or sand or hidden between the valves should develop such beauties. The periostracum is usually thin and inconspicuous, but sometimes by color or quality of surface adds attractiveness to shells otherwise dull or colorless.

The geographical distribution of groups in the Veneridæ has some marked characteristics, which are especially brought out when the distribution is scrutinized by the minor groups, such as sections. Omitting fossils, which in the main agree very closely with the recent species in distribution, *Sunetta* and the whole group covered by *Gafrarium* and *Lioconcha*, except the section *Gouldia; Meretrix*, and most of the sections of *Cytherea*, except *Cytherea* and *Ventricola*, *Mysia*, *Gomphina*, *Macridiscus;* most of the sections of *Katalysia*, and all the great group of *Paphia*, except the usually dull and unattractive *Protothaca*, are unknown in the waters of the New World.

On the other hand, *Transennella*, *Pachydesma*, *Hysteroconcha*, *Cyclinella*, and *Parastarte* appear to be exclusively American. *Eutivela* and *Eucallista* belong to the southeastern shores of America, *Liocyma* to the boreal seas, *Saxidomus* and *Protothaca* to the west coast of America, with slight extensions to northeastern Asia and Australasia. *Venus* is originally and typically American, with one emigrant in northern Japan. *Gemma* and *Psephidia* agree in the main with *Venus*. No member of the group of *Circe* or *Gafrarium* occurs on the Pacific coast, though I anticipate that *Gouldia* will turn up there sooner or later. *Chionella*, *Pitaria*, *Katalysia*, and *Venerupis* are almost ubiquitous. Of the Dosiniinæ only *Clementia* and *Dosinidia* are known to be residents of America. In harmony with the late development and specialization of the family is the fact that of the one hundred and thirty-seven species known as American only two exist on both shores of North America. Eighteen species extend through

the temperate and boreal regions, belonging to twelve groups, of which *Saxidomus* and *Psephidia* have no representatives known in our tropical waters. The Tropics in America have representatives of twenty-nine groups, of which *Tivela* and *Chione* are the most prolific in species; none of the other groups exceeds four species. In individuals the groups of the Temperate Zone seem to be most prolific, such as *Venus*, *Protothaca*, *Saxidomus*, and *Agriopoma*, and from these the greater portion of the food supply derived from members of this family by man is obtained.

The southern limit of the tropical fauna on the west coast of South America is near Payta, Peru. On the east coast it descends at least as far as Rio de Janeiro, its northern limit reaching the latitude of Cape Hatteras offshore and Cape Canaveral on the actual coast. On the west coast the temperate fauna meets the northernmost extension of the tropical fauna near Point Conception, California. The northern limit of the strictly temperate-region fauna, on the west, is the line of floating ice in winter in Bering Sea, about the latitude of the Pribilof group of islands. On the east we may put the boundary near Cape Breton Island, but, owing to the inshore polar current on this side of the continent, the arctic species reach farther south and the census of the temperate fauna is more meager than on the more favored northwest coast of the continent or the western shores of Europe in the same latitude.

The recognizable ancestry of the Veneridæ appears in the Upper Cretaceous or Lower Eocene. No true Venerid, in the strict sense, appears before the Tertiary. The modifications followed through the successive horizons are most interesting. Thus, in the Oligocene we have *Hyphantosoma* with fine zigzag chiseling of the surface. In the Pliocene this sculpture is obsolete and its traces hardly to be found. The recent type has a smooth surface, but when attacked by decay the manner in which the shell weathers reveals the zigzag internal structure hidden under an apparently normal, smooth exterior, and the color-pattern frequently follows a zigzag lineation which is no longer expressed in terms of sculpture.

The beauty of the shells has led in some cases to a traffic in them by means of aboriginal trade. Thus *Hysteroconcha* was long carried to the Orient by the Lascar crews of ancient Spanish galleons, and this has led to wrong ideas of geographical distribution. *Meretrix* is a favorite with the Chinese and Japanese, not merely as a source of food or ornament, but is incorporated into lacquer work and imitated in porcelain or pottery. The common *Venus* of our own eastern coast was the source from which the Dutch and Indians prepared their shell money or wampum and ceremonial belts. A south European species in ancient times was the emblem of Aphrodite, and in the South Seas species of Veneridæ were largely used for personal adornment.

TABLE OF DISTRIBUTION OF NORTH AMERICAN VENERIDÆ.

W.=WEST COAST; E.=EAST COAST.

[Extralimital species in parentheses.]

GENUS AND SECTION.	Temperate or Oregonian.		Tropical or Panamic.	
	W.	E.	W.	E.
Dosinia:				
Dosinidia	....	....	3	3
Clementia	....	....	1	....
Transennella	1	....	1	3
Tivela	....	....	7	5
Pachydesma	....	....	1	(1)
Gafrarium:				
Gouldia	....	....	....	3
Macrocallista	....	....	....	1
Chionella	....	....	4	1
Amiantis	....	....	1	....
Eucallista	....	....	....	1
Callocardia	....	....	....	1
Agriopoma	....	1	1	3
Pitaria	....	....	6	6
Hysteroconcha	....	....	2	1
Lamelliconcha	....	....	3	1
Cytherea	....	....	1	1
Ventricola	....	....	4	4
Saxidomus	2	....	....	....
Cyclinella	....	....	4	1
Chione	....	....	11	5
Timoclea	....	....	4	4
Lirophora	....	....	4	2
Anomalocardia	....	....	2	5
Venus	1	1	1	2
Marcia	1	....	1	....
Venerella	1	....	....	....
Protothaca	1	....	2	....
Callithaca	1	....	....	....
Liocyma	3	1	....	....
Venerupis	1	....	2	....
Gemma	....	1	....	1
Parastarte	....	....	....	1
Psephidia	2	....	....	....
Totals in each fauna	14	4	66	55
Species native to both oceans	....	....	2	....
	14	4	64	55
Total North American Veneridæ	....	....	....	137

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Family VENERIDÆ.

The subdivisions adopted are characterized as follows:

Subfamily DOSINIINÆ.

Hinge with three left and three or four right cardinals, usually with an anterior left lateral fitting into a pit in the opposite valve and sometimes a developed posterior right lateral. Siphons long and united to their tips; foot large, arcuate, without a byssus or byssal groove; shell usually orbicular and generally more or less compressed, with a distinct pallial sinus.

A. *Anterior and sometimes posterior laterals present, the lunule impressed, but not distinctly limited.*

Genus DOSINIOPSIS Conrad, 1864.

Type, *D. Meekii* Conrad. Eocene.

Shell orbicular, heavy, concentrically striated, with a thick, polished periostracum; lunule impressed, but not circumscribed distinctly, and there is no defined escutcheon; inner margins smooth; pallial sinus short, free, acutely angular, and ascending; hinge strong, with corrugated nymphs and a strong rugose left anterior lateral fitting into a rugose pit in the opposite valve; right valve with a stout distinct posterior right lateral, which fits into an excavated socket in the left valve.

This is the only genus of the family with a distinctly developed posterior lateral tooth, and if it were not for the number of cardinals and the presence of a pallial sinus it might be referred to *Cyprina*.

Subgenus Æora Conrad, 1870. Type, *Æ. cretacea* Conrad. Cretaceous.

This is still imperfectly known, but differs from *Dosiniopsis* chiefly by being smaller, more delicate, and of a more elongated form.

Subgenus **Pelecyora** Dall, 1902. Type, *Cytherea hatchetigbeensis* Aldrich, 1886. Eocene.

Shell orbicular, with rugose nymphs, simple anterior lateral and socket; no posterior lateral; the pallial sinus narrow, angular, ascending; the cardinals entire except the right posterior one, which is bifid; otherwise as in *Dosiniopsis*, though the only known species is very much smaller than the known species of *Dosiniopsis*.

This group differs from *Dosiniopsis* by its smooth lateral and socket, and by the absence of the posterior lateral and socket, and by its relatively deeper pallial sinus. From *Æora* the same characters, as well as the nonbifid left cardinals and orbicular form, suffice to distinguish it. The rugosity of the nymphs is more like the semiradial rugæ in *Tivela* than the fine granulations of the type of *Dosiniopsis*.

B. *Anterior lateral tooth and a defined lunule present.*

Genus DOSINIA Scopoli, 1777.

Type *D. africana* Hanley (Le Dosin, Adanson, 1757).

This is *Cytherea* (sp.) Bolten, 1798; *Orbiculus* α and β. Megerle, 1811; *Arthemis* (Poli) Oken, 1815; *Asa* (Leach) Basterot, 1825; *Arctoë* Risso, 1826; *Exoleta* Brown, 1827; *Artemis* Conrad, 1832; *Arctoa* Herrmannsen, 1846; *Cerana* Gistel, 1848; *Assa* (Leach) Gray, 1851; *Amphithæa* Leach, 1852; but not *Dosina* Gray, 1838.

Section *Dosinia* s. s.

Lunule impressed, small; escutcheon narrow, elongate, flattish, bordered on each side by a ridge or keel, at which the concentric sculpture tends to become lamellose; middle cardinals often grooved or bifid, the other teeth smooth; pallial sinus angular, ascending, usually narrow and extended forward at least halfway from the posterior to the anterior adductor; valves moderately convex.

The form of the escutcheon differs in this group from an obscure flattening, often unequal in the two valves, to a distinctly keeled area with sculpture differing from that outside the boundary, but in the series of species almost every gradation between these forms may be observed.

Section *Orbiculus* Megerle, 1811. Type, *Venus exoleta* Linnæus.

In this section there is no escutcheon, the pallial sinus is very long and narrow, and the anterior lateral is strong.

Orbiculus α Megerle, founded on *Venus prostrata* Linnæus, is a typical *Dosinia*. Most of the generic synonyms cited under the genus were based on the common European species which is the type of this

section. The young do not retain any corrugations on the posterior cardinals.

Section *Austrodosinia* Dall, 1902. Type, *Cytherea anus* Philippi. New Zealand.

Lunule deeply impressed, escutcheon impressed and bordered by prominent keels; pallial sinus short and angular; anterior lateral and the pit into which it is received, and usually some of the anterior cardinal teeth sharply corrugated; the middle cardinals bifid.

This group is represented in New Zealand and Japan.

Section *Dosiniscа* Dall, 1902. Type, *Artemis alata* Reeve.

Areas of the lunule and escutcheon pouting mesially, defined by a deep sulcus, forming a posterior wing which recalls *Phacoides*; sculpture of fine, rather distant, sharp lamellæ, sometimes with radial striation; pallial sinus deep and angular.

This group is distributed in Australia and Japan.

Section *Dosinorbis* Dall, 1902. Type, *Artemis bilunulata* Gray. Japan.

Lunule and escutcheon deeply impressed, the former surrounded by a larger area bordered as is the escutcheon by a lamellated keel; valves compressed, beaks produced, sculpture on the middle of the disk obsolete, becoming lamellæ laterally; pallial sinus short, angular; right posterior margin grooved beyond the hinge plate, to receive the beveled edge of the opposite valve.

This large and remarkable species appears to be unique in the genus. In the young the dorsal margins pout on each side of the ligament.

Section *Dosinidia* Dall, 1902. Type, *Venus concentrica* Born.

Valves, suborbicular, subcompressed, white, with a sculpture of concentric grooving, never lamellose, furnished with an obvious periostracum; lunule small, impressed; escutcheon absent; pallial sinus ample, ascending, angular in front; posterior cardinals serrate or corrugated in the nepionic young, smooth in the adult.

This group is confined to the tropical and warmer temperate seas of America.

Section *Dosinella* Dall, 1902. Type, *Cytherea angulosa* Philippi. East Indies.

Valves suborbicular with a shallow flattish lunule; the escutcheon narrow, flattish, hardly defined; pallial sinus ample, ascending, deep, bluntly rounded at the anterior end; anterior lateral and posterior right cardinal teeth absent or obsolete.

There are a few small species in which the bight of the pallial sinus is rounded, but in this large form the contrast between the blunt rounded form and the angular form usual in the genus is so marked that, after some hesitation, taking the obsolescent hinge-teeth into consideration, it seemed advisable to separate it sectionally.

C. *Lateral teeth absent, no lunule or escutcheon.*

Genus CYCLINA Deshayes, 1849.

Type, *Venus sinensis* Gmelin. China seas.

Soft parts like *Dosinia;* shell orbicular, concentrically and radially striate, without lunule or escutcheon; inner margins crenate; pallial sinus angular, ascending; teeth as in *Dosinia*, but without laterals, the posterior right cardinal obsolete.

It is not *Cyclinus* Kirby, *Coleoptera*, 1837.

Genus CLEMENTIA Gray, 1842.

Type, *Venus papyracea* Gray.

Soft parts as in *Dosinia*, according to Woodward; valves thin, concentrically undulate, convex, without lunule or escutcheon; inner margins simple, sharp: pallial sinus subangular, ascending; three cardinal teeth in each valve, the posterior right cardinal bifid; lateral teeth absent.

This is *Blainvillia* Huppé, 1854, not of Desvoidy, *Diptera*, 1830.

Subfamily MERETRICINÆ.

An anterior lateral tooth present; though sometimes obsolete, traces of it can always be detected in normal specimens.

Genus GRATELOUPIA Desmoulins, 1828.

Type, *Donax irregularis* Basterot. Miocene.

Valves elongate-oval, concentrically striate; three cardinals in each valve, the posterior right cardinal fused with the nymphal rugosities; the pallial sinus long and acute, reaching to the vertical of the anterior lateral lamina.

Subgenus **Cytheriopsis** Conrad, 1865. Type, *Cytherea hydana* Conrad. Eocene.

Valves trigonal, recalling *Tivela*, the left posterior cardinal fused with the nymphal rugosities; the pallial sinus short and rounded.

This is not *Cytheropsis* McCoy, 1849, and if the two names are judged incompatible, might be called *Grateloupina*. It is probably the precursor of *Grateloupia* and *Tivela*.

Genus TRANSENNELLA Dall, 1883.

Type, *T. conradina* Dall.

Shell small, having the general form and coloration of *Tivela*, but a hinge with three cardinals in each valve, the middle left cardinal bifid, and an elongate left lateral received into a socket in the opposite valve; the hinge has no rugosities, the lunule but not the escutcheon is defined, internal margins sharply tangentially grooved with numerous sulci; the pallial sinus angular, free, obliquely ascending.

Tropical and subtropical waters of America; receding in time to the Miocene. This group is unique in the family in the peculiar sulcation of the inner margin, which is only paralleled elsewhere once among the Astartidæ. A Pacific coast species is viviparous.

Genus TIVELA Link, 1807.

Type, *Venus corbicula* Gmelin (= *V. mactroides* Born).

Shell porcellanous, solid, smooth externally with a dehiscent periostracum; the coloration variable with a tendency toward dark brown and purple; valves trigonal, subequilateral, with prominent beaks and a short ligament; lunule large, faintly defined, escutcheon not defined; pallial sinus small, free, rounded in front; hinge variable with anterior laterals and from three to six cardinals, partly rugose and some of which may be bifid. Habitat, subtropical and tropical seas.

Section *Tivela* s. s. Type, *Venus mactroides* Born.

Valves trigonal, with smooth interior margins, usually a pilose periostracum over a polished surface; cardinals varying in different species.

This is *Trigona* Megerle, 1811, not Jurine, *Hymenoptera*, 1807; and perhaps *Dollfusia* Cossmann, 1886, which I know only by figures. The group is unique in the variability and occasional large number of cardinals, which are perhaps due to splitting up of the originally single posterior cardinals.

Section *Pachydesma* Conrad, 1854. Type, *Donax stultorum* Mawe.

Shell very large and ponderous, with smooth interior margins and a thick vernicose periostracum; hinge with four cardinals in each valve.

This is *Trigonella* Conrad, 1837, not of Da Costa, 1778. It is a Californian type.

Section *Eutivela* Dall, 1891. Type, *E. perplexa* Stearns, Argentina.

Shell small, elongate-trigonal, with crenulate interior margins, thin, polished periostracum, three left and four right cardinal teeth.

This type points the way toward *Sunetta*.

Genus SUNETTA Link, 1807.

Type, *Donax scripta* Linnæus.

Shell variable in form, smooth or concentrically sculptured, polished, often with vivid coloration; with an impressed, unequally divided lunule, larger in the right valve, and a deeply excavated escutcheon; posterior end of shell shorter than the anterior; pallial sinus wide, short, and rounded; inner margins conspicuously crenate; three cardinals in each valve, and rather elongate anterior laterals.

Eocene of south Europe and tropical seas of the Old World.

Section *Sunetta* s. s. Type, *Donax scripta* Linnæus.

Shell elongate-ovate, more or less inequilateral, the edge of the posterior cardinals finely rugose; sculpture concentrically sulcate or striate.

This is *Cuneus* Megerle, 1811, not of Da Costa, 1776; and *Meroë* Schumacher, 1817.

Section *Solanderina* Dall, 1902. Type, *S. solandri* Gray.

Shell inflated, smooth, subequilateral.

Section *Sunettina* Jousseaume, 1901. Type, *S. sunettina* Jousseaume, *S. menstrualis* Menke, etc.

Shell suborbicular, compressed, smooth.

Genus GAFRARIUM Bolten, 1798.

Type (by elimination), *Venus pectinata* Linnæus.

Shell equivalve, subequilateral, with a simple or slightly sinuous pallial line; three cardinals in each valve, entire or faintly grooved, and the usual anterior laterals; surface sculptured. Tertiary and recent warm seas of the Old World.

Section *Gafrarium* Bolten, s. s.

Surface with strong, chiefly radial, more or less dichotomous sculpture, that of the posterior slope differing from the rest; valves moderately convex, umbones subcompressed with a narrow lunule and feebly defined escutcheon; pallial line simple, inner margins of the valves crenate, the ligament sunken but not immersed; middle left cardinal feebly grooved.

This is *Paphia* Oken, 1815, not Bolten, 1798, or Lamarck, 1801: *Crista* Römer, 1857; and *Circe*, species, of many authors.

? Section *Radiocrista* Dall, 1902. Type, *Venus pulcherrima* Deshayes, Journ. de Conchyl., VIII, 1860, p. 381, pl. XIV, figs. 1, 2. Tertiary.

Shell with the form of *Chionella* the disk and anterior part elegantly, regularly, concentrically sulcate; margins of the dorsal area behind separated from the sulcate area by strong radial ribbing; the lunule not definitely circumscribed, but with its margins thickened and surface concentrically striated or smooth; escutcheon elongate-ovate, equally parted between the valves, nearly smooth. Interior?

The horizon and internal characters of this remarkable fossil are unknown, but it is provisionally located here, pending further information.

Section *Gouldia* C. B. Adams, 1847. Type, *Thetis cerina* Adams.

Shell small, reticulately sculptured, the radials toward the ends of the valves, and the concentric sculpture in the middle of the disk stronger; there is no specialized posterior area; moderately convex, the umbones not compressed; pallial line slightly flexuous behind, cardinals and inner margins of the valves entire.

Warm-temperate and tropical seas.

This group is *Thetis* C. B. Adams, 1845, not of Oken, 1815, or Sowerby, 1826. It is not *Gouldia* Bonaparte (*aves*), 1850. It is the only representative of the *Gafrarium* or *Circe* group in American Tertiary or recent seas, and has not yet been found on the Pacific coast.

Subgenus **Circe** Schumacher. Type, *Venus scripta* Linnæus.

Shell compressed, with only concentric sculpture, with smooth compressed beaks, narrow lunule and escutcheon; pallial line simple, inner margins smooth; posterior right cardinal grooved; ligament deeply sunken, but not entirely immersed.

Section *Parmulina* Dall, 1902. Type, *Circe corrugata* (Dillwyn) Deshayes.

Shell with the umbonal region flattened and coarsely divaricately ribbed, the rest of the surface concentrically sculptured; disk (except the umbones) convex; pallial line slightly flexuous, inner margins finely crenulate; lunule and escutcheon narrow, flat, the ligament depressed; cardinals entire or faintly grooved.

Section *Circenita* Jousseaume, 1888. Type, *C. arabica* Lamarck.

Valves convex; surface feebly concentrically sculptured, the beaks not compressed; posterior slope without specialized sculpture; lunule distinct, narrow, escutcheon hardly defined; ligament hardly depressed; pallial line with a minute sinus, the inner margins of the valves entire.

Genus LIOCONCHA Mörch, 1853.

Type, *Venus castrensis* Linnæus.

Shell solid, porcellanous, suborbicular, smooth or concentrically sculptured, vividly colored; lunule sharply circumscribed, impressed, but no defined escutcheon; ligament almost immersed, pallial line slightly flexuous, inner margins smooth, anterior left and posterior right dorsal margins grooved to receive the beveled edge of the opposite valve; anterior lateral large and strong; three smooth, entire cardinals in each valve.

Tropical seas of the Old World.

Genus MACROCALLISTA Meek, 1876.

Type, *Venus nimbosa* Solander.

Shell ovate, microscopically radially lineated, with low concentric waves, or smooth, with vivid coloration and vernicose periostracum; a defined lunule, but unequally divided between the valves; no defined escutcheon; internal margins smooth, pallial sinus free, ample, pointed in front and horizontally directed; cardinals three in each valve, smooth and entire, except a bifid right posterior tooth.

Section *Macrocallista* s. s.

Shell much elongated, the pallial sinus short, the posterior cardinals slender and elongated.

The type is better known as *Cytherea* or *Callista gigantea* (Gmelin) Lamarck.

Section *Chionella* Cossman, 1886. Type, *Cytherea ovalina* Deshayes.

Shell ovate-trigonal; pallial sinus long; the posterior cardinals short.

This is *Chione* Gray, 1838, not Megerle, 1811, or Gray, 1851; *Dione* Gray, 1851, not of Hübner, *Lepidoptera*, 1816; and *Callista* Mörch, 1853, not of Leach, 1852.

Genus AMIANTIS Carpenter, 1863.

Type, *Cytherea callosa* Conrad.

Shell ovate, concentrically waved, with vernicose periostracum; lunule and a linear escutcheon, defined; inner margins smooth; pallial sinus ample, acute in front, free below, slightly ascending; anterior cardinal very thin; anterior laterals large and strong.

Section *Amiantis* s. s.

Shell with two obscure radial ribs internally, near the middle of the disk; posterior cardinals elongated, strong, the right one bifid, the other teeth entire; the posterior left cardinal and the edge of the right nymph rugose; the posterior right dorsal margin beyond the hinge plate grooved to receive the edge of the opposite valve. Californian.

This is called *Amyantis* by Stoliczka, 1871.

Section *Eucallista* Dall. 1902. Type, *Cytherea purpurata* Lamarck.

Shell with the posterior cardinals short; the opposite faces of the nymphs with interlocking rugosities; the teeth smooth; interior without radial ridges.

Lamarck himself called attention to the remarkable corrugated areas of this shell which recall those of *V. mercenaria*. It is a Brazilian species which has been confounded with one from west America.

Genus MERETRIX Lamarck, 1799.

Type, *Venus meretrix*, Linnæus.

Shell trigonal, plump, thin, nearly equilateral, smooth with a vernicose periostracum, a peculiar olivaceous tone of coloration; lunule and escutcheon not circumscribed or distinctly defined: three cardinals in each valve and well-defined anterior laterals; the middle left and two anterior right cardinals entire, smooth, the others grooved or bifid; right nymph and posterior left cardinal corrugated; anterior left and posterior right dorsal margins beyond the hinge plate sharply grooved to receive the edge of the opposite valve; internal margins smooth; the pallial line with a shallow arcuate flexuosity, but no angular sinus; ligament hardly depressed.

Distribution chiefly in the China seas, Japan, and the Indo-Pacific region.

This group is *Cytherea* (Lamarck) and *Citherea* Roissy, 1805, and Lamarck, 1806; *Cytheræa* Defrance, 1818; *Nympha* Mörch, 1853, not Fitzinger, 1826; and *Meretrix*, *ex parte*, Deshayes, 1853.

Genus CALLOCARDIA A. Adams, 1864.

Type, *C. guttata* A. Adams.

Shell ovate, plump, thin, concentrically striated with more or less involute umbones; pallial sinus nearly obsolete; lunule feebly circumscribed, not impressed, escutcheon not defined; left anterior lateral received between two obsolete laminæ in the opposite valve; three cardinals in each valve not radiating from a point under the umbo, on the dorsal valve margin; the two anterior left cardinals continuous above and separated from the valve margin by a sulcus; the anterior and posterior right cardinals similarly connected, and dorsally separated by a groove from the margin; the arch of the two left cardinals fits over the middle right cardinal, the arch of the outer right cardinals over that of the two left ones, so that the middle right and the posterior left cardinals remain isolated; the dorsal margins beyond the hinge plate, in front in the left and behind in the right, are grooved to receive the beveled edge of the opposite valve.

In this group the teeth retain in the adult state the conditions which normally obtain in the early stages of hinge development as shown by Bernard.

The group is identical with *Caryatis* (part) Römer, 1862, not of Hübner, 1816; *Veneriglossa* Dall, September, 1886; and *Atopodonta* Cossmann, October, 1886. It is distributed in tropical and temperate seas and goes back to the Eocene in time.

The type was named *Callocardia guttata* by A. Adams in 1864. In 1888 Mr. Sowerby renamed it *Cytherea isocardia* on account of the existence of a *Cytherea* (*Callista*) *guttata* of Römer. The latter, however, was not described until 1866, so that it does not antedate Adams's name. If Römer's form is entitled to specific rank, it will not require a new name, as under the present arrangement it will be referable to the genus *Macrocallista*, section *Chionella*.

Subgenus **Agriopoma** Dall, 1902. Type, *Cytherea texasiana* Dall, 1892.

This differs from the typical *Callocardia* by its large, heavy, and chalky shells, without the involute umbones or any color pattern, and by the presence of a deep and angular pallial sinus. It is more northern in distribution than *Callocardia* proper, and more limited in geographical range, though receding to the Eocene in America. The peripheral species indicate a transition in the cardinals of the right valve toward the conditions found in the following group:

Genus PITARIA Römer (em.), 1857.

Type, *Venus tumens* Gmelin.

Shell trigonal, plump, concentrically striate or rippled, with an inconspicuous periostracum and delicate coloration; lunule circumscribed,

but the escutcheon not defined; inner margins smooth, pallial sinus ample, elongate, somewhat ascending, pointed in front; middle cardinal stout, the others slender; the posterior cardinals feebly grooved, the others entire; the cardinals of the right valve discontinuous where they touch the dorsal margin and not separated from the latter by a groove; anterior lateral adjacent, distinct; nymphs and teeth smooth; dorsal margins grooved as in *Meretrix*. Widely distributed in the Tropics.

Römer's original name, *Pitar*, is a vernacular African word, not really entitled to be used without Latinization, for which, in 1862, he substituted *Caryatis*, which is preoccupied in Lepidoptera since 1816. It is probable that a Latinized form as above should be adopted for the group.

Section *Pitaria* s. s. Type, *Venus tumens* Gmelin.

Shell smooth or with concentric striation, usually convex, subtrigonal or ovate, with a pointed sinus.

Section *Hyphantosoma* Dall, 1902. Type, *Cytherea carbasea* Guppy, 1866. Oligocene.

Shell with zigzag sculpture on the surface like *Textivenus* Cossmann, of the Venerine series.

Section *Tivelina* Cossmann, 1886. Type, *Cytherea tellinaria* Lamarck. Eocene.

Shell pointed behind with a Tellina-like twist to the valves, which are concentrically striate; hinge as in *Pitaria;* pallial sinus short, bluntly rounded.

Subgenus **Hysteroconcha** Fischer, 1887. Type, *Venus dione* Linnæus.

Shell subtrigonal, plump, concentrically laminate; lunule and escutcheon defined by incised lines and impressed, the laminæ becoming spinose near the boundary of the escutcheon; shell with tinted coloration not in patterns; inner margins smooth, pallial sinus linguiform, ample, free, slightly ascending; hinge as in *Pitaria*, the edges of the nymphs finely granular and the stout middle cardinal sometimes obscurely channeled.

Tropical American waters.

This is *Dione* Gray, 1847, not Gray, 1851, nor Hübner, 1816; and *Venus* Megerle, 1811, not of Lamarck, 1799.

Section *Lamelliconcha* Dall, 1902. Type, *Cytherea concinna* Sowerby.

Shell trigonal, subcompressed, concentrically ribbed or laminate, without spines; the edges of the nymphs smooth; otherwise like *Hysteroconcha*.

Tropical seas, especially in America.

Genus CYTHEREA Bolten, 1798.

Types (by elimination), *Venus puerpera* Linnæus, *V. rugosa* Gmelin, and *V. verrucosa* Linnæus.

Shell large and rotund, convex, with strong predominantly concentric sculpture with well-marked lunule and escutcheon, the latter unequally

divided, larger in the left valve; umbones plump, ligament deep seated; cardinals large and partly bifid; anterior lateral small, papilliform; inner margins crenate; pallial line with a short rounded sinus.

Subgenus **Cytherea** Bolten, s. s. Type, *Venus puerpera* Linnæus.

Shell large, reticulately sculptured, the right portion of the escutcheon produced over the sunken ligament; lateral tooth minute.

Tropical seas.

This is *Antigona* Römer, 1857, not Schumacher, 1817.

Section *Clausina* Brown, 1827. Type, *Venus verrucosa* Linnæus.

Shell large, strongly concentrically lamellose, with obscure divaricating radials toward the ends; right portion of the escutcheon not overlapping the ligament: pallial sinus small, narrow, angular.

Tropical and temperate seas.

This is *Venusarius* (Dumeril) Froriep, 1806 (not binomial); *Dosina* Gray, 1838; *Venus* Swainson, 1840, not Lamarck, 1799; *Calista* (Poli) Leach, 1852, not Mörch, 1853; *Callista* Fischer, 1887, but not *Clausina* Römer, 1857.

Section *Ventricola* Römer, 1857. Type, *Venus rugosa* Gmelin.

Shell large with strong, distant, evenly spaced concentric lamellæ, between which are smaller concentric threads; pallial sinus small, angular, lunule deeply impressed; right part of the escutcheon obsolete.

Tropical seas of both hemispheres.

Subgenus **Aphrodina** Conrad, 1868. Type, *Meretrix tippana* Conrad. Cretaceous.

Shell concentrically striated, with a circumscribed lunule, but no defined escutcheon; inner margins smooth, pallial sinus ample, free, ascending, rather rounded in front; hinge with three cardinals in each valve, the right posterior cardinal bifid; an elongate anterior lateral corrugated on both sides and received into a pit with similar corrugations; nymphs smooth.

This form wants the posterior lateral and the granular nymphs of *Dosiniopsis*, and differs from *Cyclorisma* by its form, the presence of an anterior lateral and a defined lunule.

Subgenus **Antigona** Schumacher, 1817. Type, *Cytherea lamellaris* Schumacher (+ *Dosina lamarckii* Gray).

Shell having the form and sculpture of a *Chione* (Megerle), but with a lamelliform well-developed anterior lateral entering a socket in the right valve; the posterior right cardinal broad and deeply bifid; pallial sinus small, triangular.

Schumacher's type has been confused with *Chione cancellata*, but an examination of his figures and references makes his meaning plain.

Section *Antigona* s. s.

Shell rather elongate, with profuse concentric lamellation crenulated by fine radial ribs; lunule deeply impressed, the ligament exposed, the overlap of the escutcheon small.

This is not *Antigonus* Hübner, 1816, or *Antigona* Römer, 1857.

Section *Artena* Conrad, 1870. Type, *Venus staminea* Conrad. Miocene.

Shell trigonal or short, with acute concentric laminæ, between which are minute elevated concentric lines; lunule not deep; escutcheon large, not overlapping; posterior right cardinal narrow, laminar; other features as in *Antigona*.

This section bears to *Antigona* much such a relation as *Ventricola* does to typical *Cytherea*, in the other subgenus. It was called *Artenia* by Tryon in 1884.

Subgenus **Circomphalus** Mörch, 1853. Type, *Venus plicata* Gmelin (= *V. dysera* Linnæus *pro parte*).

Shell cordate, compressed, with distant elevated reflected laminæ which have leaflike expansions near the posterior border; lunule and escutcheon, impressed, striate, sharply limited, unequally divided between the valves; ligament deeply sunken; inner margins crenate, pallial sinus small, triangular; anterior right and posterior left cardinals slender, laminar, entire, the others bifid; a minute pustular anterior left lateral present.

This is *Anaitis* Tryon, 1884, not of Duponchel, 1829, or Römer, 1857; and *Chiona* Römer, 1857, not of Mörch, 1853. *V. calophylla* Hanley, also belongs here.

Subgenus **Lepidocardia** Dall, 1902. Type, *Chione floridella* Gray (+ *Venus africana* Philippi).

Shell small, compressed, donaciform, smooth or concentrically striated, polished; lunule defined, but there is no defined escutcheon; internal margins smooth; pallial sinus linguiform, pointed in front, horizontally directed, partly confluent with the pallial line below; dorsal margins beyond the hinge plate grooved; teeth delicate, the anterior laterals well developed, the posterior right and anterior two left cardinals more or less distinctly grooved.

Though compressed, this form recalls *Gomphina* by its external characters.

Genus SAXIDOMUS Conrad, 1837

Type, *S. nuttallii* Conrad.

Shell large, rude, chalky, ovate-quadrate, with low beaks, and concentric usually feeble sculpture; the ligament is strong and not depressed; there is no defined lunular area or escutcheon; internal margins smooth; pallial line with a deep, rounded sinus; hinge with three cardinals in each valve; the posterior right cardinal bifid; anterior laterals closely adjacent to the cardinals, one of the left ones often in line with the anterior cardinal.

Shores of the North Pacific.

This group has been generally misunderstood and placed, as by Deshayes, near *Tapes*. His group of radial sulcate *Saxidomus*, of 1853,

all belong to *Callithaca*. The anterior lateral is so close to the cardinals that it has been counted in with them. The animal is meretricine, with long, closely united siphons. The group on the Pacific coast recedes to the Eocene in time.

Subfamily VENERINÆ.

ANTERIOR LATERAL TEETH ABSENT.

Genus CYPRIMERIA Conrad, 1864.

Type, *C. excavata* Morton. Cretaceous.

Pallial line feebly flexuous behind.

Subgenus **Cyclorisma** Dall, 1902. Type, *Cyclothyris carolinensis* Conrad. Cretaceous.

Pallial line deeply sinuated.

This is *Cyclothyris* Conrad, 1875; not of McCoy, *Brachiopoda*, 1844.

Genus THETIRONIA Stoliczka, 1871.

Type, *Thetis major* Sowerby, 1826. Cretaceous.

Surface granulose; pallial sinus high, angular vertically ascending; no lunule or escutcheon. This is *Thetis* Sowerby, 1826, not of Oken, 1815.

? Subgenus **Thetiopsis** Meek, 1876. Type, *T. circularis* Meek and Hayden. Cretaceous.

Smaller and smoother, the sinus shorter and irregular at its anterior basal part.

This is *Tethiopsis* Fischer, 1887.

Genus MYSIA (Leach MS.) Lamarck, 1818.

Type, *Venus undata* Pennant.

Siphons separated; hinge with two right and three left cardinal teeth; a circumscribed lunule, but no escutcheon. European.

This is *Lucinopsis* Forbes and Hanley, 1848, but not *Mysia* Gray, 1847.

Genus CYCLINELLA Dall, 1902.

Type, *Dosinia tenuis* Recluz.

Three cardinal teeth in each valve; otherwise like *Mysia*. American.

This genus extends to the Oligocene in time.

Genus CHIONE Megerle, 1811.

Type, *Venus cancellata* Lamarck.

Three cardinal teeth in each valve; pallial sinus short, angular; lunule and escutcheon defined, sculpture cancellate, inner margins of the valves crenate; concentric sculpture dominant.

Subgenus **Chione** s. s. Type, *V. cancellata* Lamarck.

This is *Chiona* Mörch, 1853, and of Römer, 1857; *Circomphalus* Adams, 1857; and *Omphaloclathrum* Tryon, 1884, not Mörch, 1853. It is not *Chion* Scopoli, 1777; *Chionis* Forster, 1788; *Chione* Desvoidy, *Diptera*, 1830; *Chionea* Dalman, 1816; nor *Chione* Gray, 1838. In a few of the larger species like *C. gnidia*, a feeble fourth cardinal is sometimes present in the right valve below the ligament; and the right posterior dorsal margin behind the ligament is sometimes grooved to receive the beveled edge of the opposite valve. In *Gomphina* alone have I found any anterior grooving of the margin in the left valve. The siphons are separate and short, the cardinals entire or feebly channeled.

Section *Chione* s. s. (See above.)

Section *Timoclea* Brown, 1827. Type, *Venus ovata* Pennant.

Sculpture predominantly radial, the concentric element feeble, the escutcheon smooth; the middle left and two posterior right cardinal teeth grooved.

This is *Pasiphaë* Leach, 1852, not Risso, 1826; *Leukoma* Römer, 1857, and *Leucoma* Stoliczka, 1871, not of Stephens, 1829; *Cytherea* H. and A. Adams, 1857, not of Bolten, 1798; *Murcia* (part) Römer, 1857, not of Koch, 1835.

Section *Clausinella* Gray, 1851. Type, *Venus fasciata* Da Costa.

Sculpture of broad concentric waves and fine concentric striæ, the radials obsolete; the waves not pinched out behind; the ligament covered by the margin of the valves when closed.

This is *Zucleica* Leach, 1852.

Section *Lirophora* Conrad, 1864. Type, *Venus athleta* Conrad; a recent species is *V. paphia* Linnæus.

Sculpture of broad concentric waves, attenuated and often conspicuously lamellose distally; radially striate; ligament exposed; the edges of the right nymph and posterior left cardinal with interlocking rugosities.

This is *Clausina* Römer, 1857, not of Brown, 1827; *Anaitis* (*paphia*) Fischer, 1887, not of Tryon, 1884; and *Anaitis* (part) Römer, 1857, not *Anaitis* Duponchel, 1829.

?Section *Volupia* Defrance, 1829. Type, *V. rugosa* Defrance, Eocene of Hauteville.

Shell small, sculpture superficially resembling *Lirophora*, but with lunule and posterior area defined by a deep sulcus dividing the disk into three areas crossed by thick, swollen, concentric ribs; beaks high and curved; hinge of three teeth, of which one is bifid; pallial line not sinuated?

In placing this shell here I have followed Fischer, since the species has not been well figured and the descriptions given of it are far from clear. I have not been able to obtain specimens for examination. From the very obscure figure of Defrance I should have suspected

this shell to be Lucinoid and to belong somewhere in the vicinity of *Here* Gabb.

Section *Chamelea* Mörch, 1853. Type, *Venus gallina* Linnæus.

Sculpture of narrow, close concentric waves or low lamellæ, without distal lamellation or radial sculpture; teeth entire; ligament exposed; the escutcheon and lunule smooth.

This is *Ortygia* Brown, 1827, not Boie, 1826; *Hermione* Leach, 1852, not of Blainville, 1828; *Orthygia* Mörch, 1853; *Chamelæa* H. and A. Adams, 1857; *Murcia* (part) Römer, 1857, not of Koch, 1835, and probably *Parvivenus* Sacco, 1900.

Subgenus **Gomphina** Mörch, 1853. Type, *Venus undulosa* Mörch.

Valves more or less rostrate, the surface usually smooth and polished, inner margins entire; dorsal margins gooved and beveled beyond the hinge plate; the posterior right and two anterior left cardinals grooved; ligament exposed. Pallial sinus short, free, and rounded in front.

Section *Gomphina* s. s. Type, *V. undulosa* Mörch.

Valves usually heavy, solid, and very tumid; the lower edge of the right nymph and the upper edge of the left posterior cardinal with reciprocal rugosities.

This is *Marcia* (H. and A. Adams part) Chenu, 1862, and Tryon, 1884, not of Fischer, 1887; *Hemitapes* Stoliczka, 1871, not Römer (part) 1857; not *Gomphina* Chenu, 1862.

Section *Macridiscus*[a] Dall, 1902. Type, *Venus æquilatera* Sowerby.

Valves more equilateral, trigonal and compressed, less heavy and sometimes with feeble striation distally; nymphs and teeth entire, smooth.

This is *Gomphina* H. and A. Adams, 1857, not of Mörch, 1853.

Genus ANOMALOCARDIA Schumacher, 1817.

Type, *Venus fluctuosa* Linnæus.

Valves rostrate, with a vernicose periostracum, sculpture obsolete mesially; the inner margins crenulate, the ligament exposed, the lunule and escutcheon impressed; cardinal teeth entire, three in each valve, the anterior right cardinal feeble, sometimes obsolete; pallial sinus small, angular, sometimes nearly obsolete.

Section *Anomalocardia* s. s.

Surface with predominantly concentric sculpture, vernicose periostracum, and the adjacent surfaces of the posterior left cardinal and right nymph minutely rugose. America and West Africa.

This is *Triquetra* Anton, 1839, after Blainville, 1818, but not of Conrad, 1846; it is *Cryptogramma* Mörch, 1853.

Section *Anomalodiscus* Dall, 1902. Type, *Cytherea squamosa* Lamarck.

Surface with reticulate subequal sculpture, a dull papery periostracum, and the hinge without rugosities. Indo-China.

[a] From *Macer*, not from μακρος.

Genus VENUS (Linnæus) Lamarck, 1799.

Type, *Venus mercenaria* Linnæus.

Shell large, heavy, earthy, trigonal; with faint radial and stronger concentric lamellar sculpture; lunule and escutcheon well defined; internal margins crenulate; pallial sinus small, triangular; there are two bifid cardinals in the left valve, one bifid and two anterior simple cardinals in the right valve, with a rugose area in each valve representing a supplementary cardinal below the ligament, the rugosities interlocking when the valves close; the ligament is strong and wholly exposed; the posterior dorsal margin of the right valve grooved to receive the edge of the left valve. The genus is American.

It is *Mercenaria* Schumacher, 1817, and *Crassivenus* Perkins, 1869.

Genus MARCIA (H. and A. Adams, 1857) Fischer, 1887.

Type *Venus exalbida* Dillwyn.

Shell large, subquadrate, concentrically lamellose and striated, without radial sculpture, and with a dull, earthy surface; internal margins smooth; pallial sinus small, angular, free; hinge with three left and four right cardinals, the middle ones larger and grooved above. Australasia and southern South America.

Subgenus **Marcia** s. s. (See above.)

This is a *Venus* without hinge rugosities, radial sculpture, or marginal crenation. There is a well-defined lunule, but no defined escutcheon; the ligament is exposed.

It is *Katelysia* (part) Römer, 1857, not of Tryon, 1884.

Subgenus **Katelysia** (Römer, 1857) Tryon, 1884. Type, *Venus scalarina* Lamarck.

Shell rounded-trigonal, subcompressed, very inequilateral, sculptured with concentric riblike ridges, sharper distally, polished, porcellanous, with no radial sculpture; coloration lively, anterior end sharper; lunule smooth, circumscribed, escutcheon defined only by absence of sculpture; ligament short, internal margins smooth; hinge plate buttressed between the pedal and adductor scars; three cardinals in each valve, the anterior right and posterior left slender, entire, the others grooved or bifid; the anterior left and posterior right dorsal margins beyond the hinge plate sharply grooved to receive the beveled edge of the opposite valve. South Seas.

Section *Katelysia* s. s. (See above.)

The inequilateral ovate form of these shells is quite striking. *Chamelea* Chenu, 1862, not Mörch, 1853; *Murcia* (part) Römer, 1857, not Koch, 1835; and *Catelysia* Fischer, 1887, are synonymous.

Section *Hemitapes* Römer, 1857. Type, *Venus rimularis* Lamarck.

Shell trigonal, tumid, with a keeled escutcheon and short, rounded pallial sinus.

This is otherwise essentially like the preceding section, but owing to the different form appears very distinct. It is not *Hemitapes* of Stoliczka, Tryon, and Fischer.

Section *Venerella* Cossmann, 1886. Type, *Venus hermonvillensis* Deshayes. Eocene.

Shell small, ovate, concentrically striate; lunule large, circumscribed, escutcheon not defined; internal margins smooth; pallial sinus small free, ascending, rounded in front; three cardinal teeth in each valve, the margin of the hinge plate excavated at the interspaces; posterior right cardinal long, bifid; the other teeth entire.

These forms are distinguished from the smaller species of *Katelysia* chiefly by the form and disposition of the teeth.

Section *Mercimonia* Dall, 1902. Type, *Venus Bernayi* Cossmann. Eocene.

Shell small, ovate, concentrically striate, rather tumid; hinge normal, the posterior left cardinal slender, not elongated; posterior right cardinal grooved; margins entire; the pallial sinus nearly obsolete.

This is *Mercenaria* Cossmann, 1886, not of Schumacher, 1817. The species included in Cossmann's list which possess a small but deep pallial sinus might be referred to *Venerella*, from which they hardly differ.

Section *Textivenus* Cossmann, 1886. Type, *Venus texta* Lamarck. Eocene.

Shell ovate, convex, sculptured by fine obliquely reticulate or divaricate subequal threadlike ridges; lunule small, circumscribed, escutcheon bordered by a radial ridge; internal margins smooth, pallial sinus small, angular, free; three cardinals in each valve, the right posterior cardinal broadly bifid; the right posterior dorsal margin behind the hinge plate grooved to receive the edge of the opposite valve.

Section *Samarangia* Dall, 1902. Type, *Venus quadrangularis* Adams and Reeve.

Shell rounded-quadrate, subcompressed, white, with a dull surface; sculpture of concentric striation, more forcible distally; internal margins smooth; lunule unevenly divided between the valves, smaller in the right valve; escutcheon not defined; pallial sinus moderate, angular in front, free below; three cardinals in each valve, the middle left and two posterior right cardinals bifid; hinge strong.

The species belonging to this group are massive and solid. *V. lenticularis* Sowerby is an example. The anterior left and posterior right dorsal margins are grooved behind the hingeplate to receive the beveled edges of the opposite valve.

Genus PAPHIA Bolten, 1798.

Type, *P. alapapilionis* Bolten (= *Venus rotundata* (part) Gmelin, *not* Linnæus).

Cardinals, three in each valve; the anterior right and posterior left cardinals entire, the others often bifid.

Subgenus **Paphia** s. s.

Valves elongate-oval, subcompressed, with close concentric riblets covered by a vernicose periostracum and without radial sculpture; coloration brilliant; escutcheon and lunule narrow, smooth, impressed, the lunule unequally divided, the right portion encroaching on the left; inner margins smooth; the pallial sinus free, ample, rounded in front, obliquely ascending.

The species are of warm temperate and tropical seas in the eastern hemisphere, and are reported from the Tertiaries of South Europe since the Eocene. *Eutapes* Chiamenti, 1900, and *Callistotapes* Sacco, 1900, are synonymous.

Section *Baroda* Stoliczka, 1871. Type, *Venus fragilis* D'Orbigny. Cretaceous.

Valves elongate, thin, with purely concentric sculpture; the posterior cardinals elongated, sometimes grooved, the others simple; pallial sinus ample, horizontal, rounded in front; margins entire.

This group appears to be the Mesozoic precursor of *Paphia*. The Tertiary *Taurotapes craveri* (Michelotti) Sacco, seems hardly distinct from *Baroda*.

Section *Icanotia* Stoliczka, 1871. Type *Psammobia impar* Zittel, Gosau.

This is stated to differ from *Baroda* only by the presence of more or less radial sculpture.

Section *Paratapes* Stoliczka, 1871. Type, *Venus textile* Gmelin.

Valves elongate, turgid, smooth or feebly concentrically sculptured; lunule circumscribed, narrow; escutcheon undefined; middle cardinals bifid as in *Paphia;* inner margins entire; pallial sinus obliquely ascending, small, squarish anteriorly.

This is *Textria* Römer, 1857, not Sundeval, 1833.

Section *Protapes* Dall, 1902. Type, *Venus gallus* Gmelin (+ *V. malabarica* Dillwyn).

Valves trigonal, closely concentrically ribbed, with no radial sculpture; a vernicose periostracum; a large elongate impressed lunule, no differentiated escutcheon; smooth inner margins; an ample, obliquely ascending pallial sinus, rounded in front; the two anterior and the left posterior cardinals entire, the others bifid; all the teeth short and concentrated.

This is *Pullastra* Chenu, 1862, not Sowerby, 1826.

Subgenus **Tapes** Megerle, 1811. Type, *Venus literata* Linnæus.

Valves oblong, subcompressed, vertically expanding and subangular on the posterior dorsal margin; lunule set off by an incised line, the escutcheon defined by a carina, both long and narrow; surface concentrically grooved; internal margins smooth; pallial sinus ample, horizontal, free below, rounded in front; the posterior right and two anterior left cardinals bifid or grooved; colors lively, often with a dark lineated pattern on a paler ground.

Tropical and temperate waters of the Old World. *Parembola* Römer, 1857, is synonymous.

Section *Tapes* Megerle s. s. (See above.)

Section *Polititapes* Chiamenti, 1900. Type, *Venus aurea* Gmelin.

Valves oblong, plump, not angular above, behind; surface with fine concentric sculpture and obscure radial striation; lunule small, circumscribed, escutcheon not defined; pallial sinus short, ascending, free below, rounded in front; color delicate and variable.

The siphons are united for three-fourths of their length in *T. virgineus* which is not known to form a byssus. The group is *Tapes* Sacco, 1900, not Megerle, 1811.

Section *Pullastra* Sowerby, 1826. Type, *Venus pullastra* Montagu.

Shell oblong, tumid, blunt behind; valves finely reticulately sculptured, with hardly differentiated lunule or escutcheon; the latter nearly linear; inner margins entire; pallial sinus deep, ample, horizontal, rounded in front and confluent with the pallial line below; the two posterior right and middle left cardinals are bifid; coloration feeble. The siphons are three-fourths united in the typical species.

Section *Myrsus* H. and A. Adams, 1858. Type, *Tapes corrugatus* Deshayes.

Valves as in *Pullastra*, but the concentric sculpture is broken and corrugated, the shell more elongate, though, from its nestling habit, very variable in outline; teeth as in *Pullastra*, lunule obscure or not defined, the escutcheon with a feebly carinate margin; pallial sinus small, slightly ascending, free below and rounded in front; inner margins smooth; coloration dull and unattractive.

This is *Metis* Adams, 1857, not 1856; *Myrsopsis* (*pernarum* Bonelli) Sacco, 1900, from the Italian Tertiaries, differs but slightly.

Subgenus **Ruditapes** Chiamenti, 1900. Type, *Venus decussata* Linnæus.

Valves convex, oblong; surface dull and feebly colored; sculpture strong distally, more or less reticulate, the concentric ridges inosculating anteriorly and feeble on the middle of the disk; the radial sculpture stronger; inner margins smooth; pallial sinus large, free below, horizontal, rounded in front; lunule circumscribed, the escutcheon feebly defined; all the inner cardinals more or less bifid; the siphons wholly free from each other and a byssus present.

Temperate and tropical regions of the Old World. This is *Amygdala* Römer, 1857, not of Van Phelsum, 1774; *Cuneus* H. and A. Adams, 1857, but not of Da Costa, 1776. It is not *Amygdalum* Megerle, 1811.

Section *Ruditapes* s.s. (See above.)

Subgenus **Protothaca** Dall, 1902. Type, *Venus thaca* Molina (+ *V. dombeyi* Lamarck).

Shell ovate, convex, coloration white or dull; surface dull, reticulately sculptured, the radials usually stronger; sculpture more or less distinctly divided into three areas, the middle of the valves with chiefly radial, the anterior radial and scabrous, the posterior with irregularly concentric sculpture; lunule and escutcheon of the left valve, sharply circumscribed; in the type species the right valve shows no escutcheon and the margin partially overlaps that of the left valve but does not conceal the ligament; middle cardinals grooved or bifid; pallial sinus free, moderate, pointed in front; the inner margins sharply crenulated in the typical section.

Section *Protothaca* s. s. (See above.) The siphons are short and united, the foot hatchet-shaped and not byssiferous. The distribution of this group includes the west coast of America, Japan, and New Zealand (*V. costata* Quoy).

Section *Callithaca* Dall, 1902. Type, *Tapes tenerrima* Carpenter.

Sculpture delicate, uniform over the disk and reticulate except in distorted individuals; lunule feebly defined with no escutcheon; the dorsal margin not overlapping in the right valve; inner margins entire, otherwise as in *Protothaca*.

Distribution, Northwest America. The tropical species of *Protothaca* are maculated, the northern forms yellowish white, with a dull surface. There is no byssal groove and the papillose siphons are united to their tips in the type species. The group is *Saxidomus* β of Deshayes, 1853.

Genus LIOCYMA Dall, 1870.

Type, *Venus fluctuosa* Gould.

Shell small, white or unicolored, covered with a vernicose periostracum, and concentrically waved, without radial sculpture; lunule circumscribed, escutcheon absent; inner margins smooth; pallial sinus short, free, rounded triangular; three cardinals in each valve, the anterior right and posterior right, entire, the others bifid; siphonal tubes unequal, the anal shorter, both united to their tips; foot long and pointed, without a byssal groove; the mantle open ventrally and smooth edged.

Distribution, Boreal and arctic waters of the Northern Hemisphere.

The group was called *Lyocima* by Barrois in 1887, and the species were formerly referred to *Tapes*.

Genus VENERUPIS Lamarck, 1818.

Type, *Venus irus* Linnæus.

Valves elongate and subquadrate; sculpture radial with distant, prominent concentric lamellation; lunule and right half of the escutcheon absent, left half of the latter defined by a keel; ligament exposed; the pallial sinus short, ascending, free, blunt in front; internal margins smooth in the type species; there are three cardinals in each valve, the anterior right and posterior left entire and slender, the others broad and deeply bifid; the siphons are long, united for half their length and with papillose orifices.

The species of this group are nestlers and often deformed. They have been much confused with species of *Petricolidæ*.

The name has been spelled *Venerirupis* by Sowerby and *Venererupes* by Swainson. *Petrifora* Latreille, 1827, may be identical, but *Irus* Oken, 1815, is a synonym of *Saxicava*.

Subfamily GEMMINÆ.

SPECIES VIVIPAROUS, MINUTE.

Genus GEMMA Deshayes, 1853.

Type, *Venus gemma* Totten.

Shell subtrigonal, with concentric sculpture, a short external ligament, and large lunule, but no escutcheon; inner margin of valves crenate; pallial sinus distinct, small, triangular; siphons separate, the branchial longer and papilliferous; an elongated posterior left and anterior right lateral tooth received into a groove on the margin of the opposite valve; foot linguiform, not byssiferous.

The genus belongs to the Atlantic coast of North America, but has been introduced on the Pacific coast with seed oysters. It is represented in the eastern Tertiaries.

It is *Tottenia* Perkins, 1869.

Genus PARASTARTE Conrad, 1862.

Type, *Astarte triquetra* Conrad.

Shell trigonal, with prominent elevated beaks, equilateral, heavy, with a short ligament and large lunule, but no escutcheon; surface smooth, brightly colored, with a vernicose periostracum; internal margins crenate; pallial line slightly flexuous behind, but with no definite sinus; right valve with a strong middle cardinal and two feeble ones; left valve with two strong cardinals, but no lateral teeth; dorsal margins outside the hinge plate feebly grooved to receive the edges of the opposite valve.

This genus is confined to the coast and Tertiaries of the southeastern United States.

It is *Callicistronia* Dall, 1883, *olim*.

Genus PSEPHIDIA Dall, 1902.

Type, *Psephis lordi* Baird.

Shell small, veneriform, polished, with faint concentric sculpture; beaks not prominent; valves inequilateral, with a narrow, feebly defined lunule and no escutcheon; inner margins not crenate; pallial sinus distinct, angular; hinge with three delicate entire cardinals in each valve, but no laterals; animal with the mantle edges fused below, the siphons short, simple; an anterior opening for the foot, which is not byssiferous.

This group is confined to the Pacific coast as far as known, and is represented in the Pacific Pliocene. It is *Psephis* Carpenter, 1864, not of Guenée, *Lepidoptera*, 1854. Carpenter named several species without specifying a type in 1864. In 1865 he selected *P. lordi* Baird as type, and for the first time gave a distinctive diagnosis of the genus. Part of the species, among those originally referred to the group, belong elsewhere. *P. tantilla* appears to be a *Transennella*, and *P. tellimyalis* is the nepionic young of *Petricola*.

EAST AMERICAN SPECIES.

DOSINIA (DOSINIDIA) CONCENTRICA Born, 1780.

Florida Keys (Conrad); Martinique, Porto Rico, Guadeloupe, Virgin Islands, Santa Cruz, and St. Thomas, West Indies; Colon or Aspinwall; Maracaibo to Rio de Janeiro, Brazil.

The *Venus concentrica* of Gmelin is a mixture of various species, the name is fixed by Born's figure, which represents the southern type. The *concentrica* of early American writers was the *D. discus* of Reeve. The *D. concentrica* of Reeve is the *D. elegans* of Conrad.

The present species is *Arthemis patagonica* Philippi, 1844; *Venus philippii* Orbigny, 1847; *Venus dilatata* Solander, 1797; and *Dosinia floridana* Conrad, 1866, was probably founded on a young specimen. *D. concentrica* is the analogue of the Pacific coast *D. ponderosa*

DOSINIA (DOSINIDIA) ELEGANS Conrad, 1846.

In the offshore warm water, near Cape Hatteras, North Carolina; at Charleston, South Carolina; east and west Florida, the Tortugas, Texas, and south to Yucatan and St. Thomas, West Indies.

This fine, flat, and evenly concentrically sculptured species was figured by Lister (pl. 288, fig. 124), and is one of those long confounded under the name of *concentrica*. The young were referred to *D. obovata* Conrad by Miss Bush in 1885.

DOSINIA (DOSINIDIA) DISCUS Reeve, 1850.

Cape May, Virginia, and south on the coast of the mainland to Vera Cruz, Mexico.

This is the most compressed and dark-colored of our East Coast species and has finer and closer striation than any of the others. It is the *Artemis* or *Dosinia concentrica* of the earlier American writers, but not of Born. The color which resides in the periostracum is frequently distributed in darker and lighter zones.

TRANSENNELLA CUBANIANA Orbigny, 1847.

Cape Florida to St. Croix, West Indies.

A small, usually pure white species, living in 8 to 30 fathoms, and especially abundant in Porto Rico. It was inadvertently and erroneously referred to *Gouldia* in the report on the Blake mollusks.

TRANSENNELLA STIMPSONI Dall, 1902.

Cape Hatteras, Egmont Key and south to Key West, in 15 to 31 fathoms.

White, with brown lineation or maculation externally, and orange or deep purple internally, in the central part of the valves. By an accident this species was figured[a] for the following species, which is a smaller and more rostrate shell. *T. stimpsoni* is the largest and prettiest of the genus so far recognized.

TRANSENNELLA CONRADINA Dall, 1883.

St. Andrew Bay, on the north coast of the Gulf of Mexico in western Florida, south to the Florida Keys and north on the east coast of Florida to Palm Beach, near low-water mark.

This peculiarly cuneate species has much the same range of color as *T. stimpsoni*, but is different in form.

TRANSENNELLA CULEBRANA Dall and Simpson, 1901.

Culebra Island, Porto Rico.

A specially trigonal, short form, white inside, and light yellow brown externally.

TIVELA ABACONIS Dall, 1902.

Abaco, Bahamas, and Vera Cruz, Mexico.

Shell small, subtranslucent, of a warm rose color, passing into white distally. It is notable for having only three cardinals in each valve.

TIVELA MACTROIDES Born, 1778.

Bahama Islands and through the West Indies and adjacent continental shores and south to Santa Caterina, Brazil.

This species may be white, or chestnut brown, or with brown rays on a lighter ground. The form is almost as variable as the coloration. The adults appear to have more tumid umbones and a longer and more

[a] Proc. U. S. Nat. Mus., XXIV, pl. xxxi, figs. 5 and 7.

pointed posterior end than the juvenile specimens. The species is the *Venus corbicula* of Gmelin, 1792; *Tivela vulgaris* of Link, 1807; *Trigona radiata* Megerle, 1811; *Venus turgens* (Solander MS.) Dillwyn, 1817; *Trigona fasciata* Schumacher, 1817, and the *Cytherea corbicula* of Lamarck, 1818.

TIVELA (MACTROIDES var.?) NASUTA Dall, 1902.

Santa Marta, Colombia; Baker.

Having the striped color pattern and tints of varieties of *mactroides*, this shell has a very much more elongated form and more delicate hinge. There is nothing in the collection which enables me to bridge the gap between the two.

TIVELA TRIGONELLA Lamarck, 1818.

West Indies, and the Gulf of Paria.

This little oval species appears to be rare. It is the *Trigona angulifera* of Gray, 1838, and perhaps the *Cytherea incerta*, Sowerby, 1851.

TIVELA BRASILIANA Dall, 1902.

West Indies; Santa Caterina, Brazil; Ihering. This form was at first supposed to be *T. bicolor* Gray, but after study it was found to differ, being a heavier and less angular shell, with the dorsal slopes less straight and the pallial sinus shorter and relatively smaller, though the shell attains a greater size than *T. bicolor*. The type is from Brazil; some young specimens from the Antilles appear to be the same.

It is not at all certain that the *T. dillwyni* Deshayes, 1853 (*T. mactroides* Sowerby, 1851), is not, after all, an extreme variety of *mactroides* Born; there is a specimen of *T. bicolor* Gray, in the collection, marked as from Florida, but it is doubtless adventitious.

TIVELA FULMINATA Valenciennes, 1827.

Coast of southern Brazil at Rio and Santa Caterina.

Arcuate, with brownish umbones and more or less zigzag tracery. It has a length, when adult, of 60 mm.

TIVELA (PACHYDESMA) VENTRICOSA Gray, 1838.

Southern coast of Brazil.

This fine species is figured from juvenile specimens in Römer's Monograph, and in all the manuals it is stated to come from China. Dr. von Ihering has repeatedly collected it from the coast of Brazil, and the Chinese habitat is certainly erroneous. One specimen in the United States National Museum measures 105 mm. in length, 90 mm. in height, and 70 mm. in diameter. It is usually white with a dehiscent vernicose periostracum.

TIVELA (EUTIVELA) PERPLEXA Stearns, 1891.

Argentine coast; and off the Rio La Plata, in 10 to 15 fathoms, muddy bottom.

Notable for its crenulated margins and yellowish-white coloration.

TIVELA (EUTIVELA) IHERINGI Dall, 1891.

Sao Paulo and Santa Caterina, Brazil, Ihering.

More delicate and arcuate than the last species, and mottled or banded with purplish brown on a paler ground color, the interior more or less purple.

GAFRARIUM (GOULDIA) CERINA C. B. Adams, 1845.

Cape Hatteras, North Carolina, and southward to Bermuda, the Antilles, and to 90 miles southwest of Cape San Roque, Brazil, from low water to 95 fathoms.

This was first described as *Thetis cerina* by Professor Adams.

GAFRARIUM (GOULDIA) BERMUDENSIS E. A. Smith, 1885.

Bermuda, Barbados, and Curaçao in 5 to 100 fathoms.

More convex, heavy, and more coarsely sculptured than *G. cerina* as a rule, but sometimes varying toward that species, which is also found in Bermuda.

GAFRARIUM (GOULDIA) INSULARIS Dall and Simpson, 1901.

Porto Rico, in 5 to 30 fathoms; also in the Oligocene of Bowden, Jamaica.

Smaller, more inequilateral, and destitute of the lively color painting characteristic of the two species above mentioned. *G. insularis* is of a grayish-white color.

MACROCALLISTA NIMBOSA Solander, 1786.

Beaufort, North Carolina, south to Cuba and west to Mobile on the Gulf coast.

This is *Venus gigantea* of Gmelin, 1792 (after Chemnitz, 1788); *Pectunculus nimbosus* "Humphrey," 1797; *Paphia ala-avis* Bolten, 1798; *Cytherea multiradiata* Menke, 1830; and *Callista* (*Macrocallista*) *gigantea* Meek, 1876.

This is the most showy of American Veneridæ, and the largest of its genus.

MACROCALLISTA (CHIONELLA) MACULATA Linnæus, 1758.

Cape Hatteras, North Carolina, and southward to the shores of the Gulf of Mexico, the Florida Keys, through the Antilles, and to the vicinity of Cape San Roque, Brazil.

It is the *Cardium trigonum* of Martyn, according to Arango.

AMIANTIS (EUCALLISTA) PURPURATA Lamarck, 1818.

Cuba (Arango) and southward to Brazil.

This is *Cytherea lubrica* Deshayes, 1853, but not of Broderip, 1835; and was named *Chione purpurascens* by Gray, 1838. It is not *Venus purpurata* Gmelin, 1792, but is *Venus brasiliensis* var. β of Gmelin.

CALLOCARDIA VESICA Dall, 1886.

Gulf of Mexico to Barbados, in 84 to 175 fathoms.

White and concentrically grooved with isocardia-like beaks. Described as *Cytherea* (*Veneriglossa*) *vesica*.

CALLOCARDIA (AGRIOPOMA) TEXASIANA Dall, 1892.

Coast of Texas from Galveston to Indianola.

Resembles the following species, but is larger, much more elongate, and with a narrower lunule. Described as *Cytherea texasiana*.

CALLOCARDIA (AGRIOPOMA) MORRHUANA Linsley, 1848.

Prince Edward's Island, and southward to the vicinity of Cape Hatteras, North Carolina, in 10 to 107 fathoms.

Rounded trigonal, earthy white, with fine inosculating, concentric wrinkling externally. This species has long been confounded with the fossil *Cytherea convexa* Say, 1824, not of Brongniart, 1811; which name was replaced by Conrad in 1833 by *C. sayana*. Both names have been applied to the present shell, which has also been called *C. sayii* by Perkins, 1869. *C. morrhuana* has lower beaks, a narrower and more delicate hinge plate, and is in general less trigonal than the Miocene fossil. Linsley's name was given to a very young shell, without description, and subsequently identified by Dr. Gould from Linsley's specimens. It has been proposed to use the name *Sayana* for the recent shell, but this is clearly inadmissible, and Conrad himself retained it for the fossil after he decided that the two were not identical.

CALLOCARDIA (AGRIOPOMA) ARESTA Dall and Simpson, 1901.

Porto Rico, in 12 to 30 fathoms.

More porcellanous, inequilateral, and rostrate than the preceding species.

CALLOCARDIA (AGRIOPOMA) ZONATA Dall, 1902.

North Carolina coast near Cape Hatteras, in 18 to 22 fathoms.

Small, trigonal, evenly concentrically grooved and zoned with yellow brown.

PITARIA ALBIDA Gmelin, 1792.

From the Florida Strait through the West Indies and on the northern shores of South America, in 4 to 25 fathoms.

An elongate, squarish, white species, with the anterior end somewhat attenuated, frequently confused with bleached valves of *P. fulminata*.

PITARIA FULMINATA Menke, 1830.

Cape Hatteras, North Carolina, to Bermuda, the Antilles, and Brazil, in depths varying from a few feet to 170 fathoms, the latter locality having afforded living young specimens.

This is supposed by Krebs to be the *Cytherea hebræa* of Lamarck, 1818.

This species appears to be very common in the West Indies. Normally it is white, with radial or zigzag painting of bright yellow brown, under a chalky periostracum. The dead valves, bleached and worn, are frequently taken for *P. albida*. It is the *Cytherea varians* of Hanley, 1844; *C. rubiginosa* Philippi, 1845; but not *C. fulminata* Philippi, 1845, or *Venus fulminata* Valenciennes, 1827. The latter is a *Tivela*.

PITARIA PENISTONI Heilprin, 1889.

Bermuda, and St. Thomas, West Indies.

A small thin oval shell, more or less painted with brown outside and with purple inside.

PITARIA SIMPSONI Dall, 1895.

West coast of Florida, at Tampa and Sarasota bays, low water to 26 fathoms.

Larger, more trigonal, and solid than the last species, but very similarly painted, though it is occasionally pure white. This is a modified descendant of the Tertiary species of *Hyphantosoma*.

PITARIA EUCYMATA Dall, 1889.

Cape Hatteras, North Carolina, and southward to the Antilles and Cape San Roque, Brazil, in 20 to 111 fathoms.

Short oval, inflated, elegantly distantly concentrically grooved, polished, and painted with brown and cream color and internally with rose; this rare species is one of the most elegant and attractive shells of the coast.

PITARIA MUNDA Römer, 1860.

St. Thomas, West Indies.

A young and dubious shell, as yet unfigured.

PITARIA (HYSTEROCONCHA) DIONE Linnæus, 1758.

Texas coast to Costa Rica and Colon; also the Antilles and Trinidad.

This beautiful and well-known shell has been fortunate in escaping with a single specific synonym, *Dione veneris* Deshayes, 1853, the other names which have been cited for it being derived from authors with no standing in binomial nomenclature, unless we except the

anonymous *Pectunculus aculeatus* of the Museum Calonnianum, in 1797.

A variety in which the spines are aborted is not uncommon.

PITARIA (LAMELLICONCHA) CIRCINATA Born, 1778.

The Antilles, the northern shores of South America, and southward to Santa Caterina, Brazil.

This shell can hardly be separated from the *P. alternata* Broderip, of the Pacific shores of South and Central America, and has been stated to occur on the west coast of Africa as the *Venus guineënsis* Gmelin, 1792. Other synonyms are *Cardium purpurea* Martyn, 1784, and *Venus rubra* Gmelin, 1792.

CYTHEREA (CYTHEREA) LISTERI Gray, 1838.

From Lake Worth, Florida, and the keys, southward through the Antilles, as far as Tortola and the Virgin Islands.

This has been erroneously identified with *V. reticulata* Linnæus and *V. crispata* Deshayes, 1853, and wrongly referred to the Indo-Pacific fauna by Deshayes. There is a dash of purple under the nymphs.

CYTHEREA (VENTRICOLA) RIGIDA Dillwyn, 1817.

Florida Keys to Rio Janeiro, including the West Indies; also in the Gulf of California.

This well-known shell is the *Venus rugosa* Gmelin, 1792, not of Linnæus, 1771; it is the *Pectunculus rigidus* Solander MS., 1798; *V. cincta* Gmelin, 1792, is probably the young, and Schröter wrongly identified our shell with *Venus casina*.

CYTHEREA (VENTRICOLA) RUGATINA Heilprin, 1886.

Cape Hatteras, North Carolina, the Gulf of Mexico and southeastward to Porto Rico in 26 to 85 fathoms; also fossil in the Florida Pliocene.

Shell resembling *C. rigida*, but with the primary concentric lamellæ more distant and the secondary lamellæ more distinct. The margin below the lunule is produced into a point.

CYTHEREA (VENTRICOLA) STRIGILLINA Dall, 1902.

From Key West, Florida, to Barbados, and 90 miles southeast of Cape San Roque, Brazil, in 20 to 100 fathoms.

Shell entirely white, much smaller than the preceding species, and with very much finer, though similar, sculpture. The lunule is also proportionately larger.

CYTHEREA (VENTRICOLA) CALLIMORPHA Dall, 1902.

Barbados in 76 fathoms; a young shell, perhaps identical, off Cape San Antonio, Cuba, in 300 fathoms.

Shell small, with a rosy flush internally and a yellow brown periostracum over a white disk. This species was identified doubtfully with Reeve's *Venus pilula* in the *Blake* report, but I am now confident that it is distinct. The sculpture resembles that of *C. strigillina*, but is less dense and prominent.

CYCLINELLA TENUIS Recluz, 1852.

Sao Paulo and Rio de Janeiro, Brazil, Guadeloupe, West Indies, Recluz; and northward through the West Indies to Cedar Keys, West Florida.

This was erroneously identified with *C. kroyeri* Philippi, in Poulsen's Catalogue. It is not the *Artemis tenuis* of Sowerby, of slightly later date than *A. tenuis* Recluz; it is smaller and more delicate than the West American species. *Lucinopsis gundlachi* Dunker, in Arango, 1878, is synonymous, and probably the unfigured *C. fragilis* Römer, 1860, from St. Thomas.

CHIONE (CHIONE) CANCELLATA Linnæus, 1767.

From Cape Fear, North Carolina, southward to Brazil, including Bermuda, the West Indies, and the adjacent coasts, in shallow water.

This very abundant and variable shell has naturally received many names, and by the early naturalists was confounded with other cancellated species of Linnæus and others. It is the *Venus dysera* and *ziczac* of various authors, but not of Linnæus; it is *V. cingenda* Dillwyn, 1817; *V. elevata* (and probably *V. inæqualis*) Say, 1822; *V. lamellata* Desbayes, 1853, in synonymy; and *Cardium bicolor* Martyn, 1784. It is the *Venus lamarckii* of Beau, but not of Gray, the *V. ziczac* of Mörch and Krebs, but not of Linnæus; the *V. maculosa* of Gmelin, 1792.

CHIONE (CHIONE) SUBROSTRATA Lamarck, 1818.

Miami, Florida, and the Keys, and south to the Abrolhos Islands, off the Brazilian coast, and Rio Janeiro, in shallow water; also on the shores of the Pacific at Mazatlan, etc.

This is also the *Venus beaui* Recluz, 1852; and *Venus portesiana* Orbigny, 1846. It is the *V. crenifera* of Carpenter in the Mazatlan Catalogue, and Sowerby, 1835; probably also *Venus lunularis* Philippi, 1844 (as of Lamarck), but not of Lamarck, 1818.

CHIONE (CHIONE) MAZYCKII Dall, 1902.

Cape Hatteras, North Carolina, and southward to the vicinity of Cape San Roque, Brazil, in 15 to 127 fathoms.

The bright rose color of the interior and its quadrate form are the most striking characteristics of this small but pretty species. It was cited in Bulletin 37, United States National Museum, as *Venus lamarckii* Gray, the young of which it much resembles, but the latter is an Indo-Chinese species, and has a different hinge.

ANOMALOCARDIA CUNEIMERIS Conrad, 1845.

From Lake Worth, Florida, and on the shores of the continent south to Cartagena, Colombia. It is not yet authentically reported from the islands of the West Indies.

This is *Venus punctifera* Gray, in Sowerby, 1853; *V. rostrata* Sowerby, 1853, a young shell; *V. flexuosa* Chenu, 1862, but not of Linnæus, 1767, nor Born, 1780. It is *V. macrodon* Reeve, in part. It is smaller, more slender, and more delicate than the *V. macrodon* of Lamarck.

ANOMALOCARDIA LEPTALEA Dall, 1894.

Lagoon at Watling Island, Bahamas. Small, very thin, curiously depauperate from its extraordinarily saline habitat. The inner margins are entire and there is no trace of radial sculpture. The coloration is very variable.

ANOMALOCARDIA MEMBRANULA Römer, 1860

St. Thomas, West Indies; Römer.

Elongate like *A. leptalea*, but with numerous (23) concentric lamellæ, obsolete posteriorly, and of a ferruginous brown, with white specks; the inner margin crenulated. Perhaps a variety of the next species.

ANOMALOCARDIA PUELLA Pfeiffer, 1846.

Punta de Maya, Matanzas Bay, Cuba.

Small, whitish, with radiating brown flecks between concentric lamellæ; internally reddish brown. The lamellæ are persistent and about 13 in number, in a shell 11 mm. long. The inner margin is crenulated. *Venus auberiana* Orbigny, 1853, is probably identical.

VENUS MERCENARIA Linnæus, 1758.

Living from Bay of Chaleurs, Gulf of St. Lawrence, and at Sable Island, southward, locally, to Cape Cod, and thence generally southward to the Florida Keys, westward to the Mississippi Delta, and, sparsely, on the coast of Texas as far west as Corpus Christi Bay. Fossil from the early Miocene to recent times.

This is the *Venus mercenaria* of Spengler, 1785, and subsequent authors; the *V. meretrix* Bolten, 1798, not of Linnæus, 1758; *Mercenaria violacea* Schumacher, 1817; *M. cancellata* Gabb, 1860; *M. antiqua* Verrill, 1875; and *Crassivenus mercenaria* Perkins, 1869.

VENUS MERCENARIA var. NOTATA Say, 1822.

New England to Georgia.

This form is marked by zigzag brown blotches and lines, and is destitute of the purple coloration internally. It is *Venus obliqua* Anton, 1837, and *V. cyprinoides* Anton, 1839.

VENUS MERCENARIA var. CANCELLATA Gabb, 1860.

A rare variety, described from the Miocene, and occasionally found living, in which the medial smooth space of the type is concentrically divided into flat riblets by shallow grooves, the riblets being also radially sulcate.

VENUS MERCENARIA var. RADIATA Dall, 1902.

Similar to the last, except that the smooth medial area is not concentrically sulcate.

VENUS MERCENARIA var. ALBA Dall, 1902.

In this form the interior is like *notata*, and the exterior destitute of colored lineation.

VENUS CAMPECHIENSIS Gmelin, 1792.

Chesapeake Bay and southward to Cuba; westward to Texas and southward to Yucatan, near low-water mark. Fossil from the Miocene to recent faunas.

This is the largest species of the family and the most ponderous, characterized by high inflated beaks, blunt ends, white shell, frequently with zigzag brown lineation in the young externally, and a surface sculpture of dense, low, thin concentric lamellation. The young usually begin in a somewhat quadrate form, with more distant lamellation, without a purple border internally, but sometimes a purple flush in the cavity of the beaks. It passes through a series of mutations analogous to those of *V. mercenaria*.

The young shells about 2 inches or so in diameter have been named *Venus calcarea* by Philippi, 1844; *V. tenuilamellata* Sowerby, 1853, and *V. fulgurans* Tryon, 1865. Gmelin's type was also an adolescent shell. The recent adult has been named *V. præparca* Say, 1822; *V. mortoni* Conrad, 1837, and *V. alboradiata* Sowerby, 1853. To the various mutations exhibited by the species in the fossil state the following names have been given: *V. tetrica* Conrad, 1838; *V. permagna* Conrad, 1838; *V. capax* Conrad, 1844; *V. submortoni* Orbigny, 1852; *Mercenaria obtusa* Conrad, 1866; *M. cuneata* Conrad, 1868, and *M. carolinensis* Conrad, 1875.

VENUS CAMPECHIENSIS var. ALBORADIATA Sowerby, 1853.

Shell with broad brownish rays on a paler ground.

VENUS CAMPECHIENSIS var. QUADRATA Dall, 1902.

Shell small, quadrate, thin, compressed, and unicolorate, usually yellowish white.

VENUS CAMPECHIENSIS var. TEXANA Dall, 1902.

Texas coast.

Shell suborbicular, inflated, with the concentric lamellæ toward the middle of the disk coalescent, forming broad, more or less inosculating, low, flat-topped ribs with polished tops, sometimes showing the brown lineations of the younger stages.

VENUS CAMPECHIENSIS var. TETRICA Conrad, 1838.

Shell with the size and dense surface sculpture of the typical form but the produced trigonal outline of *V. mercenaria*.

VENUS CAMPECHIENSIS var. CUNEATA Conrad, 1868.

Shell subtrigonal, very thick, with very prominent beaks, and very short and blunt, the antithesis of the elongated variety *tetrica*.

VENUS CAMPECHIENSIS var. CAROLINENSIS Conrad, 1875.

Shell much like the normal form but with the lamellæ more or less coalescent in the middle of the disk and not flattened or polished. This occurs living and also in the miocene of North Carolina, from which it was described.

LIOCYMA FLUCTUOSA Gould, 1841.

Arctic, Spitsbergen, and Greenland seas, and the Sea of Okhotsk; southward to the Gulf of St. Lawrence and Nova Scotia, on the Atlantic coast.

The typical form is creamy white. A variety *brunnea*, of rich chestnut or yellow brown, is noted from the Gulf of St. Lawrence. It is the *Venus astartoides* (Beck MS.) Philippi, 1849, but not of D'Archiac, 1847. *Tapes arctica* Reeve, 1864, from the "Arctic Seas," though not this species, may belong to this group.

GEMMA GEMMA Totten, 1834.

Labrador to Woods Hole, Massachusetts; New York Bay?

Flattish and irregularly rippled concentrically. The type is more or less purple, varying to pure white, which forms the variety *Manhattanensis* Prime, 1862. The species is *Gemma totteni* Stimpson, 1860, and *Tottenia gemma* Perkins, 1869.

GEMMA (GEMMA var.?) PURPUREA H. C. Lea, 1842.

Cape Cod to the Bahamas and Texas.

More inflated, trigonal, and with uniform concentric threads sharply defined. It is *Gemma concentrica* Dall, 1889. The color is variable, but usually paler than *G. totteni*.

PARASTARTE TRIQUETRA Conrad, 1845.

From Hillsboro Inlet, on the east coast of Florida, south to the Keys, and on the west coast north to Cedar Keys. Also fossil in the Pliocene.

Small, polished, very elevated, purple and white. Though much resembling *Gemma*, it can easily be discriminated by its smooth and more elevated shell.

NOTES ON AND DESCRIPTIONS OF EAST AMERICAN SPECIES.

DOSINIA (DOSINIDIA) ELEGANS Conrad.

Plate XII, fig. 6; Plate XIII, fig. 7.

Owing to the confusion that has involved this species a figure of it was thought to be desirable.

The figured shell is from Florida. Cat. No. 6120, U.S.N.M.

DOSINIA (DOSINIDIA) DISCUS Reeve.

Plate XII, fig. 1; Plate XIII, fig. 1.

No good figure of this species being available in any recent American publication, one is now supplied. The specimen is from South Carolina. Cat. No. 54094, U.S.N.M.

TRANSENNELLA CONRADINA Dall.

Plate XIII, fig. 5.

Cytherea (*Transennella*) *conradina* DALL, Proc. U. S. Nat. Mus., VI, 1883, p. 340.

A figure drawn from a specimen of *T. stimpsoni* Dall, as noted below, was inadvertently published under this name, so I now give a figure taken from one of the typical specimens. Cat. No. 64437, U.S.N.M.

TRANSENNELLA CUBANIANA Orbigny.

Plate XIII, fig. 4.

Venus cubaniana ORBIGNY, Moll. Cubana (Sagra), II, 1853, p. 278, pl. XXVI, figs. 44–46.

An enlarged figure of this species is given, which shows a few brown flecks dorsally, though this species is usually pure white. It is from Florida. Cat. No. 54135, U.S.N.M.

TRANSENNELLA STIMPSONI, new species.

Meretrix conradina DALL, Proc. U. S. Nat. Mus., XXIV, pl. XXXI, figs. 5, 7.

Shell small, rounded trigonal, rather plump, polished, painted with purple-brown on a white ground externally, the lunule, and central portion of the disk internally usually purplish; beaks prominent, incurved, small; lunule defined by a sulcus, elongate, narrow; escutcheon not defined; beaks five-fourteenths of the length from the anterior end,

which is rounded, with the dorsal slope rather flat; posterior end attenuated; hinge normal, the posterior left cardinal obscure, thin, consolidated with the nymph; internal margins tangentially sulcate; pallial sinus deep, narrow, somewhat rounded in front. Length 14; height 10.5; diameter 7 mm.

Type locality.—Egmont Key, Florida. Cat. No. 54100, U.S.N.M.

The shell is marked by fine concentric lines of growth, and by a few, irregularly distributed, stronger concentric sulci, which become evanescent toward the middle of the disk.

TIVELA ABACONIS, new species.

Plate XIII, fig. 3.

Shell small, subtranslucent, deep rose color at the beaks and in the middle of the disk, becoming paler toward the margins; beaks high, pointed, subcentral; shell moderately inflated, the ends rounded, the base gently arcuate; surface polished; hinge delicate; the teeth small, three cardinals in each valve, the anterior lateral elongate, thin, distant; pallial sinus short, wide, rounded; length, 11; height, 8.2; diameter, 6 mm.

Type locality.—Abaco, Bahamas, I. Greegor. Cat. No. 103551, U.S.N.M.

The shell is smaller, more delicate, more equilateral, and of a different color and texture from *T. trigonella* Lamarck, which is the only species comparable with it and which is white and opaque with a conspicuous periostracum.

TIVELA NASUTA, new species.

Plate XII, fig. 2.

Shell of moderate size, solid, nearly equilateral, somewhat rudely concentrically striated, with a reddish-brown polished periostracum; shell substance white, with numerous pale purple radii, the dorsal posterior margin near the end dark brown within and without; beaks pointed, dorsal slopes nearly straight; lunule impressed, defined by a distinct incised line; anterior end rounded, posterior end narrower, almost rostrate; hinge solid, with four cardinals, the anterior lateral lamelliform, prominent; pallial line with a short, small, rounded sinus. Length, 32.5; height, 25; diameter, 17 mm.

Type locality.—Santa Marta, Colombia; Baker. Cat. No. 153377, U.S.N.M.

By its rudely striated surface and produced posterior end, this seems to differ from the other Antillean forms.

TIVELA BRASILIANA, new species.

Plate XII, fig. 3.

Shell subtriangular, flattish, with high, pointed, opisthogyrate beaks; cream color with darker yellowish zones; surface smooth; lunular region impressed, lunule narrow, elongate, pouting a little at the junction of the valve margins; posterior slope straight, flattened, with a short ligament: interior pale yellow brown; hinge with five right cardinals, the posterior pair rugose; the anterior lateral adjacent, strong; the pallial sinus rounded, about as large as the posterior adductor scar. Length 40; height 34; diameter 20 mm.

Type locality.—Santa Caterina, Brazil. Cat. No. 125468, U.S.N.M.

This peculiarly flat and triangular form recalls the *T. planulata* Sowerby, of the Pacific coast.

CALLOCARDIA (AGRIOPOMA) ZONATA, new species.

Plate XII, fig. 4.

Shell small, thin, arcuate, with a dull surface, whitish with concentric zones of yellow brown; surface concentrically striated or sulcate with wider interspaces, forming low riblets; beaks high, inflated, their apices small, anteriorly directed, lunule large, cordate, defined by a sulcus; no visible escutcheon; ends rounded, base prominently arcuate; interior porcellanous, with a small ascending angular pallial sinus; hinge verging toward *Chionella.* Length 23; height 18.5; diameter 14 mm.

Type locality.—United States Fish Commission station 2608, in 22 fathoms, sand, off the coast of North Carolina. Cat. No 92015, U.S.N.M.

CYTHEREA (VENTRICOLA) STRIGILLINA, new species.

Plate XII, fig. 5.

Shell rotund, inflated, grayish white; beaks prominent, their apices anteriorly directed; lunule deeply impressed, cordate, striated; disk covered with low, uniform, slightly recurved thin primary concentric lamellæ, about 1 millimeter apart, the interspaces with much finer and smaller secondary lamellæ; there is no defined escutcheon, but the posterior dorsal slope, as usual, is less prominently lamellose; hinge strong, with large teeth, the anterior lateral large, and the posterior cardinal on the right valve bifid; pallial sinus very small, wide, and angular; internal margins of the valves finely crenulate. Length 45; height 39; diameter 32 mm.

Type locality.—United States Fish Commission station 2317, in 45 fathoms, coral, off Key West, bottom temperature 75° F. Cat. No. 95668, U.S.N.M.

This species is easily distinguished by its fine close sculpture and pale grayish color from either of the other American species of *Cytherea*. The interior is pure white.

CYTHEREA (VENTRICOLA) CALLIMORPHA, new species.

Plate XIII, fig. 6.

Shell small, globose, covered with a thin yellowish periostracum over a white shell with a salmon-colored flush internally; beaks full, prominent, the apices turned forward; lunule cordate, circumscribed, evenly striated; surface with about 27 primary concentric lamellæ having a T-rail section, the flat interspaces having 6–8 extremely fine low concentric threads, crossed by fine radial striation; escutcheon limited by an obscure ridge, ending in a subangular projection of the margin; in front of the ridge is a wide shallow radial depression; hinge well developed; posterior right cardinal long, distant from the others and bifid; middle right cardinal deeply bifid; anterior lateral small, papilliform; interior surface polished, with a salmon-colored flush behind the beaks; pallial sinus small, sharply angular, ascending; inner margins finely crenate. Length 16; height 14.5; diameter 12 mm.

Station 272, in 76 fathoms, at Barbados, West Indies, United States Coast Survey steamer *Blake*. Cat. No. 64292, U.S.N.M.

The peculiar form of the primary lamellæ renders them very liable to fracture, and if broken off they leave no visible trace, and the surface appears uniformly concentrically threaded, since the basal attachment of the primaries is no wider than the normal width of the secondary threads.

CHIONE MAZYCKII, new species.

Plate XIII, fig. 2.

Shell small, subrostrate, with low distant concentric lamellæ crossing flat radial ribs, those radials in front of the middle later becoming double, while the ribs behind the middle remain single; all the ribs are separated by subequal smooth interspaces except near the anterior margin, where interstitial threads appear; the concentric lamellæ become laminate, especially on the right valve, near the posterior end; lunule distinct, lanceolate, striated; escutcheon defined by a keel, striated, the right half somewhat overlapping the other, painted with brown streaks or entirely brown; disk white with pale-brown or rose-colored radial bands and occasional darker-brown flecks; interior rose color with white near the end and basal margins; hinge normal, with a rose-colored ray below a very short ligament; pallial sinus very small and blunt, inner margins crenulated. Length, 14.2; height, 11.2; diameter, 8 mm.

Type locality.—United States Fish Commission station 2616, off

Cape Fear, North Carolina, in 17 fathoms, sand. Cat. No. 92022, U.S.N.M.

This pretty little species is easily discriminated by its form and color from *C. cancellata* at any stage of growth. It is named in honor of Mr. W. G. Mazyck, of Charleston, South Carolina.

NOTES.

The following *nomina nuda* have been cited in connection with the East American fauna: *Venus lanceata* "Say" and *V. metastriata* "Say," *Venus punctulata* "Valenciennes" and *Cytherea elevata* Conrad, by Conrad, 1846: *Cytherea bella* and *Venus orbicularis* Kurtz, 1860. Names of West American species have been mistakenly applied to those of the east coast, or West American specimens have been wrongfully attributed to eastern localities as follows: *Cytherea pannosa* Sowerby, *Tapes grata* Say, *Venus pulicaria* Broderip, *Chione cingulata* and *Artemis kroyeri* Philippi, *Chione asperrima* Sowerby, and *Callista exspinata* Reeve. Exotic species wrongly given east American habitats are: *Venus crenata* "Chemnitz," *Cytherea affinis* "Gmelin," Sowerby, 1853, *Cytherea kingii* Gray and *C. modesta* Philippi, *Dosinia dilatata* Philippi, *D. lucinalis* Lamarck, *D. cyclas* Römer, and *D. kraussii* Römer.

Species from exotic localities like St. Vincent, Cape Verde Islands, of which the names are repeated in American waters, have been catalogued as from the latter; such are *Dosinia radiata* Reeve and *Venus verrucosa* Linnæus. *Cytherea occulta* Say, 1822, is unfigured and known only by the original description. Most of the names of American *Tivela* have been indiscriminately cited from both coasts, the species being difficult to discriminate and genetically connected. *Venus foveolata* Sowerby, 1853, was described from Martinique, but Deshayes adds to the locality "China." It does not come from both places, but has not been authentically reported from the West Indies since Sowerby's time. Locard, in the report on the Talisman expedition mollusca, reports it from St. Vincent, Cape Verde Islands, in 35 fathoms. *Tapes occidentalis* Reeve, 1864, appears to be identical with a Bombay species, figured on the same plate. It is certainly not West Indian. The ascription of *Venus decorata* Broderip and Sowerby, 1835, by Reeve in 1863, to the West Indies, is erroneous. It is of a strictly oriental type and comes from the Moluccas. I suspect *Venus sallei* Reeve, 1864, of a similar origin, notwithstanding the fact that it is said by Reeve to come from "Bird Island, in the Caribbean Sea." There are a great many "Bird Islands" scattered over the world, and this shell, so far as I may judge from the figure, has an Indo-Pacific aspect.

Dosinia turgida Reeve, 1850, through confusion with *Cyclinella tenuis* Recluz, has erroneously acquired an American habitat.

WEST AMERICAN SPECIES.

DOSINIA (DOSINIDIA) PONDEROSA Gray, 1838.

Payta, Peru, northward to the Gulf of California, and to north latitude 26° 30′ on the west coast of Lower California; in the Pleistocene north to San Pedro, California.

This, the largest and finest of the genus, recalls somewhat the Atlantic *D. concentrica*. It is the *Artemis ponderosa* Gray, 1838, the *Artemis gigantea* Sowerby (in Philippi, 1847), and the *Venus cycloides* Orbigny, 1847. *Artemis distans* Sowerby, 1852, if from Puerto Potrero, Costa Rica, as suggested by Carpenter, may be identical with the young of this species.

DOSINIA (DOSINIDIA) DUNKERI Philippi, 1844.

West Colombia, at Santa Elena; Panama Bay; the Galapagos Islands; and northward to Mazatlan and the head of the Gulf of California; also to Magdalena Bay, on the west coast of Lower California.

This is *Dosinia simplex* Hanley, 1845, not of A. Adams, 1855, and *Cytherea pacifica*, Troschel, 1845, not *Venus pacifica* Dillwyn, 1817.

DOSINIA (DOSINIDIA) ANNÆ Carpenter, 1857.

Mazatlan and the Gulf of California.

This is less tumid, more elongated and smoother than *D. Dunkeri*, and has a more horizontal pallial sinus. The small *D. nanus* Reeve, 1850, was probably based on a very young specimen of this species.

CLEMENTIA SOLIDA Dall, 1902.

Topolobampo, on the west coast of Mexico; collected by E. Daniels.

This is a large and squarish species, with a more solid shell and less degenerate hinge than any of the others heretofore known. It has somewhat the aspect externally of *Saxidomus giganteus*.

TRANSENNELLA TANTILLA Gould, 1853.

Sitka Harbor, Alaska, and southward to Lower California at Todos Santos Bay, in 3 to 16 fathoms; also fossil in the Pleistocene of Santa Barbara, California.

Trigonal, moderately convex, rather elongate; white, with or without zigzag brown painting, usually with the posterior dorsal slope dark purple within and without.

This species is viviparous and was referred by Carpenter to his genus *Psephis* on that account, but has a wholly different hinge. It has been referred to *Venus*, *Trigona*, etc., but on the basal margin has the sulcations of *Transennella*, though less distinct than in the typical species. The Pleistocene specimens were named *Venus rhysomia* by Gabb in 1861.

The more northern specimens are smaller and more oval than those from Santa Barbara, the type locality; and the purple streak is reduced to a more or less distinct flush, which is occasionally wholly absent. These characters, however, seem hardly pronounced enough to deserve a varietal name.

TIVELA PLANULATA Sowerby, 1829.

Gulf of California, Gulf of Tehuantepec, and southward to the coast of Ecuador.

This includes the variety *suffusa* Sowerby, 1835; *Donax lessoni* Deshayes, 1835; *Cytherea undulata* Sowerby, 1851, a color variety; and *C. mactroides* Lamarck, 1818, not of Born, 1778. It is extremely variable in coloration, but maintains fairly well its compressed triangular form.

TIVELA HIANS Philippi, 1851.

Magdalena Bay, Lower California, to Valparaiso, Chile.

This form, described from Mazatlan, is more elongated and rostrate, has a more livid purplish coloration and a very distinct gape behind, by which it is separated from *T. planulata*.

TIVELA ARGENTINA Sowerby, 1835.

West Mexico and south to Panama.

Distinguished by its yellowish-white color, thin shell, and arcuate form attenuated at both ends. It is *Cytherea æquilatera* Deshayes, 1839.

TIVELA ARGUTA Römer, 1864.

Gulf of California to Panama.

Shell small, thin, and oval, recalling *T. trigonella* of the Antilles.

TIVELA GRACILIOR Sowerby, 1851.

Puntarenas, Costa Rica.

This is a species of peculiar form, with fine elevated radial lines anteriorly. It is not the shell figured by Römer under this name.

TIVELA BYRONENSIS Gray, 1838.

Scammon's Lagoon, Lower California and the Gulf of California, and southward to the coast of Ecuador.

This is *T. radiata* Sowerby, 1835, not of Megerle, 1811; *Venus solangensis* Orbigny, 1847; *Cytherea stultorum* Menke, 1847, not of Mawe, 1823; *Cytherea corbicula* Menke, 1847, not of Lamarck, 1818; *Cytherea pulla* Philippi, 1851, and perhaps *C. intermedia* Sowerby, 1851, and *T. elegans* Verrill, 1870. *Trigona humilis* Carpenter, 1857, appears to be the young fry of this species; *T. semifulva* Menke is a nearly white variety, and *T. hindsii* Hanley, 1844, is a striped and latticed color form of the young shell. It is the most common of the Pacific coast species and the analogue of *T. mactroides* of the Antilles.

TIVELA DELESSERTI Deshayes, 1854.

Scammon's Lagoon (young?); Cape St. Lucas, the Gulf region, and south to Acapulco.

This is the *Cytherea nitidula* Sowerby, 1851, not of Lamarck, 1818; the young fry were named *Tivela marginata* by Carpenter, but I do not find that this name has ever been defined in print. It is an elegant polished shell, delicately painted with light purplish brown on a cream-colored ground.

TIVELA (PACHYDESMA) STULTORUM Mawe.

Santa Cruz, California, and south to Ballenas Lagoon, Lower California, and perhaps to Mazatlan.

This is the *Donax stultorum* of Mawe in 1823, but not the *Tivela stultorum* of Menke in 1847; the *Trigonella crassatelloides* Conrad, 1837; *Cytherea solidissima* Philippi, 1851; *C. æquilatera* Römer, 1857, not of Deshayes, 1839; *C. lamarckii*, *C. stultorum*, and *C. crassatelloides* of Reeve in 1864. This is the largest and finest species of the genus, and is well known to most conchologists under the name of *Pachydesma crassatelloides*. A related fossil, *P. inezana*, is said by Conrad to exist in the California Miocene.

MACROCALLISTA (CHIONELLA) SQUALIDA Sowerby, 1835.

Cerros Island, Pacific coast of Lower California, to the Gulf and southward to Peru, in 7 to 27 fathoms.

Chione biradiata Gray, 1838, and *Cytherea chionæa* Menke, 1847, are synonymous. The Philippine *C. elegans* Koch, in Philippi, 1844, has been united with them, but is probably distinct. The species is much like *Macrocallista chione* of Europe, but less attractive. It is the analogue for the Pacific coast of *M. maculata* Linnæus, of the Antilles.

MACROCALLISTA (CHIONELLA) AURANTIACA Sowerby, 1831.

Gulf of California, Cape St. Lucas, and southward to Guayaquil, in 10 to 18 fathoms.

More compressed, redder, and with a dark and dull instead of translucent vernicose periostracum, compared with *M. squalida*. It was first figured and named in Sowerby's Genera of Shells, Part XXXIII, but Hanley's name of *aurantia* given thirteen years later has been more generally used.

MACROCALLISTA (CHIONELLA) PANNOSA Sowerby, 1835.

Cape St. Lucas, the Gulf of California, and southward to Valparaiso, Chile.

This pretty little species is extremely variable in its color pattern. *Cytherea lutea* Koch, in Philippi, 1845, is synonymous.

+ Chionella preoccupied, replaced by Paradione.

MACROCALLISTA (CHIONELLA) PUELLA Carpenter, 1864.

Gulf of California and south to Acapulco.

Marvelously like *M. pannosa* in color and form, but always a smaller and thinner shell, with other distinctive characters.

These two species have a great similarity to the Eocene type on which the section *Chionella* was founded.

AMIANTIS CALLOSA Conrad, 1837.

San Pedro, California, to Cape St. Lucas, in shallow water.

This elegantly sculptured, pure white species is well known. *Dione nobilis* Reeve, 1863, is based on a specimen somewhat more rounded than usual.

CALLOCARDIA (AGRIOPOMA) CATHARIA Dall, 1902.

Ballenas Bay, on the Pacific shore of Lower California, to the Gulf of California and southward to the Bay of Panama in 7 to 66 fathoms.

White, somewhat chalky, sharply concentrically striated, with a subcuneate outline and papyraceous periostracum. The analogue of the West Indian *C. aresta* Dall and Simpson, 1901.

PITARIA NEWCOMBIANA Gabb, 1865.

Monterey, California, to Clarion Island and the Gulf of California in 15 to 31 fathoms.

Thin and delicate, with zigzag brown markings and a papery periostracum when fresh.

PITARIA TOMEANA Dall, 1902.

Bay of Panama (Galapagos Islands?), and Tome, Chile, in about 10 fathoms.

The apparent analogue of *P. fulminata* Menke of the Atlantic fauna, but without color painting on the specimens so far obtained.

PITARIA CONSANGUINEA C. B. Adams, 1852.

Panama.

Belongs in the group with *C. albida*, etc., but has radial brown markings and pinkish umbones. I have not seen it.

PITARIA POLLICARIS Carpenter, 1864.

Gulf of California, Cape St. Lucas, and south to Callao, Peru.

A fine, large species, the young with brown painting, the adults mostly polished white. It is *Dione prora*, variety, of Reeve, 1863, but not of Conrad; *Cytherea obliquata* Römer, in part, but not of Hanley, 1844. The true *prora* comes from the Hawaiian Islands.

PITARIA UNICOLOR Sowerby, 1835.

Humboldt Bay, Lower California, and south to Panama.

Somewhat compressed, the concentric sculpture obsolete in the middle of the disk, the color uniform white or brownish. The brown variety is *Chione badia* Gray, 1838, and *Cytherea lignla* Anton, 1839. *Cytherea lubrica* Sowerby, 1835, is perhaps identical. Some specimens are almost rostrate.

PITARIA VULNERATA Broderip, 1835.

Magdalena Bay, on the Pacific shore of Lower California, to the Gulf of California and south to the Bay of Panama.

Remarkable in its violet zones of coloration and for having the inner margins often obscurely crenulate, a feature not known elsewhere in the genus. It is the *Cytherea tricolor* of Pease (MS.) according to Römer, 1867. The young are maculated with brown and the adults sometimes radially lineate with the same color; young specimens of elongate ovate form, which have not assumed the violet rim, have a very different aspect from the mature shell or the normally orbicular young ones.

PITARIA (HYSTEROCONCHA) LUPANARIA Lesson, 1832.

Ballenas Bay, Pacific coast of Lower California, the Gulf of California, and southward to Payta, Peru.

A larger but less elegant analogue of the Antillean *P. dione* Linnæus, easily recognizable by the violet spots at the base of the spines. It appears, as from China, under the name of *Cytherea semilamellosa* Gaudichaud, in the Récueil des Coquilles non figurées of Delessert in 1841. It has also been regarded by several authors as a mere variety of *P. dione*. *Dione exspinata* Reeve, 1863, is a mutation in which the spines are abortive. Northern specimens usually have the concentric sculpture carried evenly across the disk, but in the south a variety is common in which the ribs are obsolete on the posterior half of the disk. The name is frequently misspelled *lupinaria*. It is *Cytherea dronea* Gray, 1833.

PITARIA (LUPANARIA var.) MULTISPINOSA Sowerby, 1851.

Realejo, Central America, and southward to Payta, Peru.

This is a small form in which the concentric sculpture and spines are sharp and crowded, while the coloration is less intense, so that the whole shell is more like *P. dione* than the better developed normal form is. There seems to be insufficient reason for regarding it as a distinct species. The *Cytherea brevispinosa* Sowerby, 1851, seems to have been founded on a single bleached specimen in which the inner

row of spines is wanting and the outer row abortive. *Dione brevispinata* and *D. brevispina* Deshayes, 1853, are variants of this name. *Callista longispina* Mörch, is doubtless a mutation of this species.

PITARIA (HYSTEROCONCHA) ROSEA Broderip and Sowerby, 1829.

Gulf of California to Panama.

Reddish brown, flattish, with only hints of spines, which lie in a white streak radiating from the umbo. *Cytherea lepida* Chenu, 1847, is synonymous.

PITARIA (LAMELLICONCHA) CONCINNA Sowerby, 1835.

Magdalena Bay, Pacific coast of Lower California, to the Gulf of California, southward to Panama Bay, the coast of Ecuador and Payta, Peru.

Donaciform or even rostrate, with concentric round-edged ribs, white, with radial streaks of brown; all brown; or all white.

Cytherea affinis Broderip, 1835, and *Venus paytensis* Orbigny, 1847, are synonymous.

C. tortuosa Broderip, 1835, is a white specimen with the ribs more irregular than usual. According to Römer, *C. suppositrix* Menke, 1849, may be this species.

PITRARIA (LAMELLICONCHA) CIRCINATA Born, var. ALTERNATA Broderip, 1835.

Gulf of California to Payta, Peru.

When fully developed this is larger, more convex, and with more distant concentric ribs than any Atlantic specimens I have seen. Immature specimens are often hardly distinguishable. For synonymy see Atlantic list.

The original *alternata* of Broderip was founded on two shells, perhaps distinct from each other. The description was taken from one and the suggestion of the name from the other, which last is represented by Reeve's figure 28*b*, in the Iconica, 1863. Those writers who have had an opportunity to examine Broderip's types agree in referring them to *P. circinata* as a variety; from the figures I should suppose them to be closer to *P. concinna*. Römer, in 1868, figures the second or white form with alternating ribs (pl. XXXVI, fig. 2), which is more like *P. circinata* than the other.

PITARIA (LAMELLICONCHA) CALLICOMATA Dall, 1902.

Bay of Panama, in 7 to 30 fathoms.

White and rather earthy, with primary concentric lamellæ, from one to three secondary smaller lamellæ intervening between each two primaries. It is more elongate, with a longer and narrower lunule than *circinata* and more oval than *alternata*.

CYTHEREA (VENTRICOLA) FORDI Yates, 1890.

Santa Barbara Islands, California, and south to the Gulf of California and to Panama Bay, in 13 to 58 fathoms.

This fine species is near to but quite distinct from *Venus toreuma* Gould[a] a Polynesian species, with which Carpenter doubtfully united it, and by whose name it has passed for some years. It reaches a a length of 65 mm., and is easily recognized by its *Isocardia*-like form, concentric undulations and sharp radial striæ.

CYTHEREA (VENTRICOLA) MAGDALENÆ Dall, 1902.

Off Magdalena Bay, west coast of Lower California, in 36, and in Panama Bay in 18 fathoms.

The analogue of *C. strigillina* Dall, of the Atlantic fauna, but thinner, less inflated, with more delicate sculpture, and pale yellowish coloration spattered with brown flecks.

CYTHEREA (VENTRICOLA) RIGIDA Dillwyn, 1817.

Gulf of California in 9½ fathoms, sand, off the peninsular coast near La Paz. Also in the Atlantic fauna.

The discovery of this well-known Atlantic shell by the United States Fish Commission steamer *Albatross* in the Gulf of California was a surprise: but the specimen, 85 mm. in length, does not seem to differ constantly in any respect from the West Indian shells. The synonymy is summarized in the Atlantic list. It is not *Venus rigida* Gould, 1850. The Pacific shell was named *Venus isocardia* by Verrill in 1870.

CYTHEREA (FOVEOLATA VAR.?) LEPIDOGLYPTA Dall, 1902.

Purchased at Acapulco by W. H. Dall in 1868.

This species has an extraordinary resemblance externally to *Venus campechiensis* of the same size, but it has the hinge of *Cytherea*. It also resembles the figure of *Venus foveolata* Sowerby, 1853, a species referred to both Martinique and China by Deshayes. The raised lamellæ are minutely, transversely, closely striated, but there is no radial interstitial sculpture. The shell is of a yellowish white color. It was purchased with a lot of beach shells, all West American, at Acapulco.

CYTHEREA (CYTHEREA) MULTICOSTATA Sowerby, 1835.

Gulf of California and south to Panama Bay, in moderate depths of water; also at the Galapagos Islands.

Belonging to the group of *C. listeri*, but more oval and with somewhat different sculpture. *Venus thouarsi* Valenciennes, 1846, is probably synonymous. The anterior lateral is usually obsolete in adult specimens, but distinct in the young.

[a] *Venus toreuma* Gould, July, 1850, from Mangsi Island; + *V. crebrisulca* Sowerby, 1853, and *V. jukesii* Deshayes, 1853, Luzon, and Port Essington, North Australia.

SAXIDOMUS NUTTALLII Conrad, 1837.

Baulinas Bay, California, and south to San Diego.

There are two species of *Saxidomus* on the coast, of which one has brownish markings near the beaks in the young, and a trace of purple internally on the upper posterior margin. The other is all white or yellowish. The present species is rather thin, but reaches a length of 120 mm., and is usually rudely concentrically sulcate. It is the *Venus maxima* Anton, in Philippi, 1846; the *Saxidomus aratus* Gould, 1861, also called by him in the index *S. ovatus* (1862); while the young, with its colored markings, he named *Tapes gracilis* in 1855. Conrad's type was young, 50 mm. long, but his allusion to the color markings settles the identity of the species referred to.

SAXIDOMUS GIGANTEUS Deshayes, 1839.

The Aleutian Islands, from Attu eastward to Kadiak, and southward to the Bay of Monterey, California.

There is no sufficient evidence of the occurrence of this species on the Asiatic coast. It is solid, broad, and heavy; the young are yellowish white; the adult attains a length of 130 mm., and the concentric sculpture is much less pronounced than in *S. nuttallii*. The exterior is sometimes fulvous, but the interior is always white. Specimens which have nestled in rock crevices are usually stunted and distorted. The synonymy has been much confused. It is the *Venus sulcata* of Potiez and Michaud, 1844, but not of Montagu, 1803, or Lamarck, 1818. It was named *Venerupis gigantea* by Deshayes, and has been confounded with *S. squalidus* Deshayes, a South American species, and *S. nuttallii* Conrad.

CYCLINELLA SUBQUADRATA Hanley, 1845.

St. Elena, West Colombia; Panama Bay; Mazatlan, and northward to Guaymas, on the Gulf of California, in 7 to 25 fathoms.

Arthemis saccata Gould, 1851; *Cyclina saccata* Deshayes, 1853; *Artemis tenuis* Sowerby, December, 1852, not of Recluz, June, 1852 (and not *Artemis turgida* Reeve, 1850), are synonymous.

CYCLINELLA KROYERI Philippi, 1847.

Chile and Peru; Salango, West Colombia, in 9 fathoms; and the Gulf of California in 14 to 26 fathoms.

Artemis macilenta Reeve, 1850, appears to be synonymous. It is *Venus kroyeri* Philippi, 1847, but not *Lucinopsis kroyeri* Poulsen, 1878. It is smaller, more orbicular, and proportionately flatter than *C. subquadrata*.

CYCLINELLA PRODUCTA Carpenter, 1856.

Panama Bay, Bridges.

This species, represented by a unique valve in the Cumingian collection, is said to be produced behind like *Cyrena maritima* C. B. Adams.

CYCLINELLA SINGLEYI Dall, 1902.

Guaymas, on the Gulf of California, and at the delta of the Yaqui River near Guaymas, Singley.

This is a moderate sized but turgid species with fine, sharp striation, heavy shell, and the posterior adductor scar very large.

CHIONE (CHIONE) FLUCTIFRAGA Sowerby, 1853.

San Pedro, California, to the Gulf of California and on the shores of the Gulf.

The sculpture of the middle of the disk is strong in youth, obsolete or absent in older stages; some large oblique specimens recall in sculpture *Venus mercenaria*. The species is *Venus callosa* of Sowerby and Deshayes, in 1853, but not *Cytherea callosa* Conrad, 1837; *Dione gibbosula* Deshayes, 1853, and Reeve, 1863, and *Venus cortezi* (Sloat MS. in) Carpenter, 1864, are synonymous.

CHIONE (CHIONE) UNDATELLA Sowerby, 1835.

San Pedro, California, to the Gulf of California and southward to Guayaquil.

A species larger than but varying like *C. cancellata*, with many names; a large series of good specimens leaves no doubt as to the consolidations needed. The characteristics are the generally inflated and closely concentrically lamellose form. The young have the lamellæ more distant, but they are always thin and sharp. The type is painted with angular brown lines like *Venus notata;* young specimens with dark brown blotches are Carpenter's *Venus excavata* of 1856. Specimens without brown painting, adult, and conspicuously lamellose are *V. simillima* Sowerby, 1853. The left half of the escutcheon is usually smooth; the right half may be smooth or lamellose. When coarsely lamellose we have the variety *neglecta* Sowerby, 1839. Carpenter is much confused in his synonymy of these species. *V. nuttallii* Conrad, 1837; *V. entobapta* Jonas, 1845; *V. perdix* Valenciennes, 1846; *V. bilineata* Reeve, 1863; and *V. subrostrata* Reeve, 1863, not of Lamarck, 1818, are synonymous. *V. sugillata* Reeve, 1863, recalls a young acidulated specimen.

CHIONE (CHIONE) SUCCINCTA Valenciennes, 1833.

San Pedro, California, the Gulf of California and south to Panama.

This is another variable species, about which Carpenter fell into

confusion. It can be discriminated from *C. undatella* by its coarser and more distant sculpture and the fact that in the adult the ribs of the middle of the lower half of the disk generally are thickened and flattened, showing a polished surface which nearly covers the interspaces. *V. californiana* Conrad, 1837; *V. californiensis* Broderip, 1835; *V. leucodon* Sowerby, 1835; *V. simillima* Carpenter, 1857, not of Sowerby, 1853; and *V. crassa* (Sloat, MS. in) Carpenter, 1864, are synonymous.

CHIONE (CHIONE) COMPTA Broderip, 1835.

Peru and northward to the Gulf of California in 21 to 26 fathoms.

This species has the concentric ribs few and very distant, is relatively flatter than *C. succincta* of the same size, and the pallial line is hardly sinuated and is unusually distant from the ventral margin of the valves. *Venus californica* Carpenter, 1856 and 1872, is this species, the name arising from an error of the types.

CHIONE (CHIONE) SUBROSTRATA Lamarck, 1818.

Mazatlan, Central American coast, and south to Payta, Peru. Also on the Atlantic coast.

This is *Venus crenifera* Sowerby, 1835; *V. portesiana* Orbigny, 1846; *V. beaui* Recluz, 1852; and probably *V. lunularis* Philippi, 1844. Carpenter, in 1863, identified *V. sugillata* Reeve with this species.

CHIONE (CHIONE) PURPURISSATA Dall, 1902.

Cape St. Lucas and the Gulf of California.

This beautiful species, with the interior of the disk rosepurple, was figured by Reeve[a] as a variety of *Venus crenulata* of the West Indies (by which *Chione pubera* Valenciennes is meant), and was named variety *lilacina* by Carpenter, 1864; but it is not *Chione lilacina* Gray, 1838, and so a new name is proposed for it. It is a rounder shell than *C. pubera*, with less prominent lamellation, especially on the posterior slope, which, in this species, is often wholly destitute of lamellæ.

CHIONE (CHIONE) PULICARIA Broderip, 1835.

Gulf of California from its head to Guaymas and south to Chiriqui, West Colombia.

This is *Venus cingulata* Reeve, 1863, not of Lamarck, 1818; and *V. pinacatensis* (Sloat, MS. in) Carpenter, 1864. This species is the Pacific analogue of *C. intapurpurea* Conrad, of the Atlantic fauna, but a more elongated and pointed species.

It is *Venus pfefferi* Dunker, MS., according to Römer, 1867.

[a] Conch. Iconica, *Venus*, pl. XIII, fig. 46, 1863.

CHIONE (CHIONE) AMATHUSIA Philippi, 1844.

Gulf of California to Panama, in 7 to 24 fathoms.

Perfectly distinct from *C. gnidia*, with which it has been confused. *Venus encausta* is said by Sowerby to be a synonym, but no author is cited for it in the *Thesaurus*. It is smaller, more pyriform, and with much less prominent lamellation and finer radial sculpture.

CHIONE (CHIONE) GNIDIA Broderip and Sowerby, 1829.

Cerros Island, on the Pacific shore of Lower California, the Gulf of California, and south to Panama Bay, in 7 to 24 fathoms.

This is the largest and finest of the genus, reaching a length of 85 mm. It is white inside and, when fully adult, has the crenulated inner margin of the valves brown. I suspect *V. ornatissima* Broderip, 1835, to be founded on a particularly oval and lamellose young shell of this species.

CHIONE (CHIONE) EFFEMINATA Stearns, 1890.

"Panama Bay;" Thomas Bridges.

A small, compressed, closely reticulate species, grayish white externally, wholly purple internally, with the hinge and profile of an *Anomalocardia*, to which group I am tempted to refer it, though it, in some respects, seems closer to *Chione*. It has a very Indo-Pacific aspect.

CHIONE (CHIONE) DARWINI Dunker, 1857.

Mazatlan to Panama (Römer).

Regarded as a variety of *C. gnidia* by Carpenter, 1857, and as a variety of *C. amathusia* by Deshayes, 1853. It is stated to differ by having the ventral faces of the concentric lamellæ polished purple brown, as well as the lunule and escutcheon. I have seen no specimens which agree with the descriptions, and regard it as a doubtfully distinct form and perhaps a variety of *C. subrostrata*. It was described from Dunker's manuscript by Römer, 1857.

CHIONE (LIROPHORA) OBLITERATA Dall, 1902.

Humboldt Bay, Gulf of Panama; Arthur Schott.

This is the analogue of *C. latilirata* Conrad of the Atlantic fauna, from which it differs in having the concentric ribs less elevated and more irregular and the shell more rostrate. The coloration is about the same.

CHIONE (LIROPHORA) KELLETTII Hinds, 1844.

Gulf of California and south to the Bay of Panama in 8 to 50 fathoms.

A remarkable species, in which the concentric ribs (of a yellow-brown color) are smoothly coalescent on the disk, but are expanded as

prominent white leaflets at each end of the shell. The nepionic young are white, smooth, globular, with one or two sharp distant concentric lamellæ.

CHIONE (LIROPHORA) MARIÆ Orbigny, 1847.

Gulf of California and south to Guayaquil, in 12 to 50 fathoms.

This analogue of *Chione paphia* has narrow, high, and recurved concentric ribs, with fine radial wrinkles, obsolete in the interspaces, except near the beaks. The closeness and number of the ribs in the young is quite variable. It is quite distinct from *C. paphia*. It is the *Venus cypria* Sowerby, 1835, and *Chione cypria* Deshayes, 1853, but not *Venus cypria* Brocchi, 1814, or Risso, 1826. *Venus discrepans* Sowerby, 1853, should be compared with this species.

CHIONE (LIROPHORA) SCHOTTII Dall, 1902.

Humboldt Bay, Gulf of Panama; Arthur Schott.

Small, white, with close, flat, subconcentric, low ridges, abruptly attenuated or duplex on the posterior dorsal area; the valves rounded below with high beaks. The sculpture, on a small scale, recalls that of *Amiantis callosa*.

CHIONE (TIMOCLEA) ASPERRIMA Sowerby, 1835.

Gulf of California, at La Paz, and southward to Payta, Peru.

This shell is easily confused with *Protothaca grata* Say, from which it may be distinguished by its more rasplike surface, larger lunule, extremely long anterior cardinal, and more cuneate outline. It is yellowish or olive, sometimes maculated with brown. *Venus intersecta* Sowerby, 1852, is said to be a synonym though the figures look more like *C. pectorina*. The dubious Lamarckian name of *cardioides* has also been assigned to this species, but this depends chiefly on guesswork. The *V. pectunculoides* Valenciennes, 1839, is said to be identical.

CHIONE (TIMOCLEA) TUMIDA Sowerby, 1852.

Panama and West Colombia.

This is distinguished from the preceding by its tumid, squarish form, finer and more delicate sculpture, and longer hinge line. It is not the variety *tumida* cited by Carpenter for a Californian *Protothaca*.

CHIONE (TIMOCLEA) COLUMBIENSIS Sowerby, 1835.

Mazatlan to Payta, Peru.

This is remarkable for the strength of its flat ribs and rounded, *Cardium*-like outline. It is not the *Venus dombeyi* or *dombeii* of Lamarck, as was supposed by Deshayes, but it shares with that species the peculiarity of having the concentric sculpture absent over the middle part of the disk. It is generally of a dark mottled brownish color externally, and white or with a faint purple flush internally.

CHIONE (TIMOCLEA) PERTINCTA Dall, 1902.

Galapagos Islands.

This is a remarkable shell, white, with brown flames on the posterior dorsal slope, and a brown lunule; the sculpture almost exclusively of distant narrow sulci, which tend to fail at an anterior space in front of the vertical of the beaks. The inner margin is crenulate and white, and except the cavity under the beaks, the interior is usually of a very dark rich purple. Worn specimens were referred to *Paphia grata* Say, by Stearns in his list of Galapagos shells, in 1893.

ANOMALOCARDIA SUBRUGOSA Sowerby, 1834.

Margarita Island, Lower California, the Gulf of California, and southward to Valparaiso.

This well-known and characteristic form was named *Cytherea subsulcata* by Menke according to Philippi, 1844; and *Venus* (*Triquetra*) *triradiata* Anton, 1839.

ANOMALOCARDIA SUBIMBRICATA Sowerby, 1835.

Cape St. Lucas, the Gulf of California, and south to Panama Bay. *Venus bilineata* Reeve, 1863, may perhaps be synonymous. *Chione tumens* Verrill, 1870, is one of the numerous mutations.

VENUS KENNICOTTII Dall, 1871.

Neah Bay, Washington, to Little River, Mendocino County, California.

Shell of a yellowish-white color and apparently very rare. It is finely closely lamellose over the whole surface and the rugose area of the hinge is much smaller than in *V. mercenaria*. The corrugated space is more narrow and delicate than in the Atlantic species, but this area is still further diminished in the Japanese *V. stimpsoni* Gould, the only exotic species of the group, first named *V. orientalis* in MS. according to Carpenter, 1856.

VENUS APODEMA Dall, 1902.

Humboldt Bay, Gulf of Panama, Arthur Schott.

A rounded species with low, wide concentric riblets, radially striated on the umbones and with very feeble crenulation of the inner margins.

MARCIA KENNERLEYI (Carpenter MS.) Reeve, 1863.

Kadiak Island and Port Etches, Prince William Sound, Alaska; and southward to Monterey, California, in 8 to 18 fathoms.

The shell is grayish white, with low, coarse, somewhat irregular concentric ribbing. It has been confused by Gabb with *Venus perlaminosa* Conrad, 1855, a miocene fossil, and another form afterwards called *pertenuis* by Gabb, 1869.

MARCIA RUFA Lamarck, 1818.

Chile, northward to the Gulf of Panama.

This is the *Venus opaca* of Sowerby, 1835, and has the external features (but not the hinge) of *Saxidomus;* there is also a circumscribed lunule. *Venus lithoida* Jonas, 1844, is synonymous and *V. expallescens* Philippi, 1844, is based on the young shell. The striation on the anterior half of the shell varies and may be obsolete. On a smooth specimen Deshayes, in 1853, founded his *Saxidomus squalidus*, a name which has been wrongly applied to a northwest coast species. Jonas stated in his diagnosis that there is no lunule, but his own drawing, given by Philippi, shows it to be present; and in separating Philippi's figure from Jonas's name Deshayes overlooked the fact that both were derived from Jonas himself. He also duplicates the species by entering it as *Chione rufa* in his list.

MARCIA (VENERELLA) SUBDIAPHANA Carpenter, 1865.

Unimak Pass, Alaska, east and south to the Santa Barbara Channel, in 10 to 120 fathoms.

Thin, white with olive gray periostracum; variable in form from trigonal to long ovate. Described by Carpenter under the name of *Clementia*. It reaches a length of 63 mm. and is found in the Pliocene of California.

PAPHIA (PROTOTHACA) GRATA Say, 1831.

From Turtle Bay, on the Pacific shore of Lower California, to Cape St. Lucas, the Gulf of California, and southward to Panama Bay.

This beautiful species revels in color variations, many of which have received names. Thus it is the *Venus discors*, *tricolor*, *fuscolineata*, and *histrionica* of Sowerby in 1835, and was called *straminea* (as of Conrad) by him in 1852. Deshayes referred it to *Chione* and described a *Tapes grata* from the Philippines in 1853, which is a wholly different shell, named *T. deshayesii* by Carpenter in 1864. It was called *Venus muscaria* by Reeve in 1863, but it is not the *Cytherea muscaria* of Lamarck in 1818. *V. pectunculoides* Valenciennes, 1846, may be synonymous. The escutcheon varies from distinct to obsolete, and the species can not be divided on this character. *Tapes fluctuosa* Sowerby, 1853 not of Gould, 1841, is probably a young shell of this species.

PAPHIA (PROTOTHACA STAMINEA Conrad, 1837.

North Japan, Sakhalin, Kamchatka, Bering Island, the Aleutians, and the west coast of America, from the peninsula of Alaska southward to Cape St. Lucas and Socorro Island.

I have seen no specimens of this species from the Pribilof Islands or from south of Socorro Island. The specimens from Panama

referred to this species should be united with *P. thaca* Molina, which occurs there abundantly. It is one of the common market clams of California, and is even canned for export.

There are a number of recognizable varieties which will be noted. The typical form is elegantly radially ribbed with fine even riblets, the concentric sculpture inconspicuous, the color yellowish white with pale purplish brown maculations. This variety has been collected at Crescent City, California, and occurs from thence southward to the limits of the range, though the species is not abundant anywhere south of Monterey, California.

Conrad's original specimens came from Santa Barbara and San Diego. Absolute synonyms of the typical form are *Venus mundulus* Reeve, 1863; *Chione straminea* Deshayes, 1853, but not of Sowerby, 1852; and *Venus dispar* and *ampliata* (Gould MS.) in Carpenter, 1857.

PAPHIA STAMINEA var. PETITI Deshayes, 1839.

This is the most common form of the species, the form especially abundant north of the Columbia River. It is larger than the southern variety, of a yellowish, chalky white, or dull gray color, without maculations; and the separation of the sculpture into areas is often well marked.

It was described as *Venerupis* and afterward referred to *Saxidomus* by Deshayes. It is *Venus rigida* Gould, 1850 (not of Dillwyn, 1817), in major part, and *Tapes diversa* Sowerby, 1852.

PAPHIA STAMINEA var. LACINIATA Carpenter, 1864.

Monterey, California, to San Diego.

This extremely elegant variety is evenly reticulated by concentric and radial sculpture, and derives its individuality from the development of small prickles or spines at each intersection. When these spines are worn off it can not be separated from the variety *petiti*, but with them it is unmistakable.

PAPHIA STAMINEA var. RUDERATA Deshayes, 1853.

This form, which is found chiefly in the north, is characterized by the turgidity and prominence of the concentric sculpture, which becomes more conspicuous than the radial ribs. Occasionally the shells are delicate and elegant, but usually specimens of this variety are rude and irregular, coarse and unattractive. It was referred to *Chione* by Deshayes, and sometimes it looks not unlike *Marcia kennerleyi*, which, however, has no radial sculpture.

PAPHIA STAMINEA var. ORBELLA Carpenter, 1864.

This variety comprises those specimens which have nestled in the borings of the large Pholads of the coast, especially at Monterey, and have been obliged to grow into an abnormally swollen and tumid

shape. They are usually chalky and of a gray tint. A variety *tumida* (but not *Tapes tumida* Sowerby, 1853) has been proposed by Carpenter, but it does not differ from *orbella* sufficiently to name, though it was renamed *Chione conradi* by Römer in 1867.

PAPHIA STAMINEA var. SULCULOSA Dall, 1902.

San Ignacio lagoon, west shore of Lower California.

This differs from the ordinary forms of the species in having the concentric sculpture obsolete, the ribs fewer and stronger, and behind the middle of the shell separated by equal or even wider unsculptured channels or interspaces. The color is pure white, and the only specimens of this variety I have seen were collected by Henry Hemphill.

PAPHIA (PROTOTHACA) THACA Molina, 1782.

Bay of Panama to Valparaiso, Chile.

When well developed this form is very striking on account of the discrepant sculpture on the different parts of the disk, a feature which exists, more or less distinctly, in all the species of this group. The young are sometimes prettily painted with purple brown. It is a notable species for economic purposes in Chile, where it is largely used for food, and called *taca*. It was first described by Molina as *Chama thaca* and referred to *Venus* by Gmelin. It is the *V. dombeii* Lamarck, 1818; *V. chilensis* Sowerby, 1835; *V. ignobilis* Philippi, 1844; but not *Venus columbiensis* Sowerby, as stated by Deshayes in 1853.

PAPHIA (CALLITHACA) TENERRIMA Carpenter 1856.

Victoria, British Columbia, and south to San Quentin Bay, Lower California.

This magnificent shell is markedly distinct in its characters from, and much larger than any of the other west coast species of the genus. It seems to be rather rare. When Dr. Gould described his *Venus rigida* (not *Venus rigida* Dillwyn, 1817) he included representatives of two species. One of these was *Paphia staminea* Conrad, and the other the present species, which was discriminated by Dr. Carpenter.

LIOCYMA BECKII Dall, 1870.

Plover Bay, Eastern Siberia, near Bering Strait, and southward to Unalaska, eastward to Kadiak and Prince William Sound, in 6 to 60 fathoms. Also North Japan.

Shell subtrigonal, inflated, with yellow or greenish periostracum, and irregular concentric sulci. Length of largest individual, 18.0; diameter, 8.5 mm.

LIOCYMA VIRIDIS Dall, 1871.

Point Barrow, Arctic Ocean, south through Bering Strait and Sea to the Okhotsk Sea, the Aleutian Islands, and eastward to Kadiak Island, Alaska, in 4 to 70 fathoms. Also North Japan.

Shell oval, quite inequilateral, when fresh of an olive-green or rich olive-brown color, bleaching on the beach to cream color, with regular, rather distant concentric sulci; subcompressed, sometime almost rostrate behind. Maximum length, 38.0; diameter, 13.5 mm.

The young are very like the adult *L. fluctuosa* Gould, of the boreal Atlantic, but have a deeper pallial sinus.

LIOCYMA SCAMMONI Dall, 1871.

Port Simpson, British Columbia, Scammon.

Brown, dark, solid, with heavy hinge and strong, prominent ligament. The umbones are more central and the pallial sinus more shallow than in any other species. Maximum length, 24.0; diameter, 11.5 mm.

VENERUPIS LAMELLIFERA Conrad, 1837.

Farallones Islands, off San Francisco Bay, and south to Lower California.

This very irregular species has obsolete radial and often very strong, distant, concentric lamellæ, though under favorable conditions, especially in adolescent specimens, the lamellæ may be thin and sharp. The young are brightly colored, the adults dull and earthy, though toward the southern extreme of its range the shell becomes more porcellanous. It was described as *Venus lamellifera* by Conrad, and *Petricola cordieri* Deshayes, 1839, is synonymous. It has been generally known as *Rupellaria lamellifera*, as determined by Carpenter.

VENERUPIS FOLIACEA Deshayes, 1853.

Cape St. Lucas, the Gulf of California, and southward to Acapulco and the Bay of Panama.

A short and foliaceous species, more or less stained with purple. *Tapes squamoso* Carpenter, 1857, from Mazatlan, is the nepionic young of this species. *Venerupis paupercula* Deshayes, 1853, if really from Mazatlan, is perhaps identical, and *Venus troglodytes* Mörch, 1861, is certainly synonymous.

VENERUPIS OBLONGA Sowerby, 1834.

Bay of Panama to Payta, Peru.

Venerupis fimbriata Sowerby, 1853, is probably synonymous; *V. elliptica* and *V. solida* Sowerby, 1834, belong in the genus *Petricola*, where Sowerby originally placed them, and not in *Venerupis*, to which they were referred by Deshayes. The relations of *V. oblonga* to *V. foliacea* are in need of elucidation.

PSEPHIDIA LORDI Baird, 1863.

Port Etches, Prince William Sound, Alaska, and southward to Catalina Island, California, in 4 to 15 fathoms.

White, pale green, or straw color, quite trigonal and plump, often containing the nepionic young.

PSEPHIDIA OVALIS Dall, 1902.

Pribilof Islands, Bering Sea, the eastern Aleutians, and the main coast eastward and southward to San Diego, California, in 3 to 20 fathoms.

Yellowish white, oval, subcompressed, and attaining a larger size than *P. lordi*.

"*Psephis tellimyalis*" Carpenter, 1864, is the nepionic young of *Petricola*, as determined from the type specimens. The name has often been mistakenly applied to *P. ovalis*, and the latter has also been mistaken for *P. lordi* in the absence of figures or typically named specimens. A species of *Psephidia* quite near to *P. ovalis* occurs in the Pleistocene terraces of Volcano Bay, Yesso, Japan, where specimens were collected by Pumpelly.

GEMMA GEMMA Totten, 1834.

Shores of San Francisco Bay, introduced with "seed" oysters from Chesapeake Bay about 1899.

The form obtained is the variety *purpurea* Lea. For synonymy, etc., see Atlantic list. It is not yet certain that the species is established on the Pacific coast.

NOTES ON AND DESCRIPTIONS OF WEST COAST AMERICAN SPECIES.

The available material for the west coast of South America is so meager that no attempt has been made to include species which do not reach the southern limit of the Panamic fauna near Payta, Peru.

CLEMENTIA SOLIDA, new species.

Plate XIV, fig. 4.

Shell large and solid for the genus, with an obscure ridge extending from near the beaks to the posterior end of the basal margin; umbonal region concentrically undulated and the whole shell concentrically, somewhat irregularly, strongly striated; beaks prominent, small; lunular region deeply impressed, though there is no defined lunule or escutcheon; ligament short, on strong nymphs; three entire cardinal teeth in each valve; inner margins smooth; adductor scars large; pallial sinus narrow, long, obliquely ascending, rather blunt in front. Height, 63; length, 79; diameter, 34 mm.

A single valve of this rather remarkable shell was brought to the United States National Museum from Topolobampo, Mexico, by Professor Daniels. Cat. No. 126352, U.S.N.M.

CALLOCARDIA CATHARIA, new species.

Plate XIV, fig. 3.

Shell large, white, somewhat earthy, with a pale olive periostracum; beaks high, prominent, strongly anteriorly directed over a large cordate lunule delimited by an impressed line; extremities slightly produced, base arcuate; anterior slope short and straight, posterior arched, a shallow sulcus cutting off a narrow raised area on each side of the ligament; surface more or less shining, finely, closely, sharply, concentrically sulcate; the middle of the shell in the early stages smooth or with the sulcations feeble, but in the adult they are uniformly continuous; interior white with a faint salmon flush in the cavity of the beaks; pallial sinus very near the margin, exceptionally wide and shallow, rounded in front; the muscular impressions quite small; hinge well developed, normal. Length, 52; height, 43; diameter, 30 mm.

Bay of Panama, in 30 fathoms, mud, at station 2799, United States Fish Commission steamer *Albatross*. Cat. No. 96368, U.S.N.M.

The species appears to be abundant and always pure white externally. The pallial sinus seems to vary in form; in the younger shells it is relatively narrower and more angular, in the adults shorter and more rounded. These differences are rather surprising, as the form of the pallial sinus in most bivalves is fairly constant.

PITARIA TOMEANA, new species.

Plate XV, fig. 2.

Shell small, yellowish white, rather earthy in texture, smooth except for very fine concentric wrinkles; beaks small, pointed; lunule small, defined by a feebly impressed line; periostracum thin, papyraceous; interior white, margins entire, the area within the pallial line earthy, the pallial sinus linguiform, short; hinge normal, solid, the anterior lateral subconical. Length, 23.5; height, 20; diameter, 12 mm.

Brought up with mud on the anchor at Tomé, Chile, by the United States Fish Commission steamer *Albatross*. Cat. No. 109220, U.S.N.M.

This is an inconspicuous little species, which may in some instances develop color markings, though the specimens obtained do not.

PITARIA (LAMELLICONCHA) CALLICOMATA, new species.

Plate XVI, fig. 8.

Shell white, rather earthy, moderately convex, elongate ovate; covered with prominent sharp, thin, concentric lamellæ, every third or fourth of which is higher than the others; near the anterior end the

lamellation is somewhat more prominent, as usually the case in this group; there are also some fine concentric wrinkles; lunule small, lanceolate, nearly smooth, impressed; ligament defended on each side by a narrow raised rib; there is no radial sculpture; interior pure white; pallial sinus long, linguiform, upper boundary of it nearly horizontal; internal margins smooth, hinge normal, anterior lateral strong. Length, 47; height, 36; diameter, 22 mm.

Bay of Panama, in 14 fathoms, mud, at station 2801, by the United States Fish Commission steamer *Albatross*. Cat. No. 96388, U.S.N.M.

CYTHEREA (VENTRICOLA) FORDI Yates.

Plate XV, fig. 7.

As the original figures in the Bulletin of the Santa Barbara Society of Natural History are accessible to few students, I have added a figure of a well-grown valve from the collection of the United States National Museum, dredged by me off the north side of Catalina Island in 16 fathoms. Cat. No. 120704. U.S.N.M.

CYTHEREA (VENTRICOLA) MAGDALENÆ, new species.

Plate XV, fig. 6.

Shell thin, inflated, suborbicular, inequilateral, the beaks near the anterior fourth of the length; color yellowish, with radial series of pale brown painting; lunule cordate, striate, flattish, pale brown; escutcheon not defined; sculpture of primary distant and secondary adjacent concentric lamellæ which are pedicillate, their expanded summits coalescent and microscopically radially, closely striate; interior white or yellowish; inner margins minutely crenate; pallial sinus small, angular; hinge strong, anterior lateral distinct in the young, anterior right and posterior left cardinals thin, entire, the others thicker and sulcate or bifid. Length, 42 (to 48); height, 38; diameter, 26 mm.

Dredged by the United States Fish Commission steamer *Albatross* off Magdalena Bay on the west shore of Lower California, at station 2989, in 36 fathoms. Cat. No. 109214, U.S.N.M.

CYTHEREA (FOVEOLATA VAR?) LEPIDOGLYPTA Dall.

Plate XV, figs. 4, 5.

Shell suborbicular, moderately convex, yellowish white, profusely concentrically lamellose; beaks prominent, anteriorly directed; lamellæ on the beaks somewhat alternated, three or four secondary lamellæ appearing between each pair of primary slightly higher ones, but over the greater part of the disk they are uniform and similar, with slightly wavy edges and the ventral face of each lamella very finely closely transversely striated, the bottom of the channels between the ribs

without sculpture except lines of growth; lunule large, cordate, circumscribed by an incised line, lamellose, the apposited edges slightly pouting; escutcheon bordered by a sharp keel in the left and a rounded ridge in the right valve; wider and smooth in the left, narrower and more or less lamellose in the right valve, the latter slightly overlapping behind; ligament sunken but not covered; the concentric sculpture slightly more prominent distally; interior white, the margins finely crenulate; the pallial sinus short, wide, angular, reaching forward only to the vertical of the posterior end of the ligament; hinge strong, the posterior pair of right cardinals and the middle left one subsulcate; anterior lateral distinct. Length, 41; height, 36; diameter, 23 mm.

Purchased with a lot of west coast beach shells at Acapulco, Mexico, in 1868, by W. H. Dall. Cat. No. 103286, U.S.N.M.

This looks almost exactly like a young quahog, externally, and the *Cytherea* hinge is a surprise. Only one specimen has been examined. It agrees with dealer's shells which come to me named *foveolata* Sowerby, a species which so far seems positively located only in the Cape Verde Islands.

CYCLINELLA SINGLEYI, new species.

Plate XV, fig. 3.

Shell suborbicular, white, shining, but not polished, covered with fine, sharp concentric striation and marked with obscure obsolete radial lineation; valves convex, slightly flattened on the posterior dorsal slope; beaks small, pointed, slightly anteriorly twisted; lunule lanceolate, defined by an impressed line; ligament long, strong, deeply inset; interior white, earthy, with entire margins and a deep, angular pallial sinus, pointing toward the umbo of the shell. Length, 39; height, 38; diameter, 23 mm.

Collected near the delta of the Yaqui River, West Mexico, by J. A. Singley. Cat. No. 108817, U.S.N.M.

This is a more inflated, more sharply sculptured, and more shining species than any of the others.

CHIONE (LIROPHORA) SCHOTTII, new species.

Plate XVI, fig. 7.

Shell small, white, rounded-trigonal, with high, pointed, slightly recurved beaks; lunule long, lanceolate, narrow; escutcheon, limited by an inconspicuous keel, nearly smooth; sculpture of close-set subconcentric, flattened ribs, separated only by much narrower sulci, and not always in harmony with the incremental lines; these ribs are abruptly attenuated or bifurcate on the posterior dorsal area; there is no trace of any radial sculpture; interior white; pallial sinus small and rather

open; internal margins crenate, hinge normal, teeth entire. Length, 14; height, 13; diameter, 8 mm.

Collected by Arthur Schott, at Humboldt Bay, Gulf of Panama. Cat. No. 6226, U.S.N.M.

These specimens are small, and very likely not of full size; they may also be somewhat bleached, but they certainly can not be identified with any of the other species of the coast.

CHIONE (LIROPHORA) OBLITERATA, new species.

Plate XVI, fig. 2.

Shell solid and heavy, subtrigonal, with very posterior beaks; of a pale yellow or yellow-brown color, with faint purplish radial flames or flecks; lunule short cordate, nearly smooth; escutcheon elongate, excavated, smooth; beaks small, anteriorly directed; surface smooth or obsoletely radially striated, sculptured with heavy tumid concentric waves which in the adult become somewhat irregular and sometimes coalescent on the disk, more or less angular and bifid on the posterior dorsal slope; interior yellowish with a flush of purple near the hinge; hinge normal; pallial sinus very short and small, angular, inner margins minutely crenate. Length, 24; height, 18; diameter, 14 mm.

Humboldt Bay, Gulf of Panama, two left valves, Cat. No. 11821 and 6227 U.S.N.M.

This is the analogue of the Atlantic *C. latilirata* Conrad, but differs by well-marked characters from that as well as from the species of the *paphia* or *mariæ* type which have regular ribs. It reaches a length of some 30 mm.

CHIONE (TIMOCLEA) PERTINCTA, new species.

Plate XVI, fig. 9.

Shell solid, ovate or cuneate, white externally, with a flush of pink near the umbones, the small lanceolate lunule dark brown, the posterior dorsal slope with wavy red-brown lines irregularly longitudinal. There is a very narrow striated escutcheon; beaks low, at the anterior third; surface with feeble concentric sculpture not rising into lamellæ; radial sculpture conspicuous, of sulci with the anterior slope steep and short, the other covering the whole interspace to the next posterior sulcus; near the lunule the sulci are close and well marked, then for a short space they are almost absent, after which they extend with rather wide interspaces to the posterior end of the shell; these characters of the sculpture may not be invariable, but in the two best preserved valves are similar; interior with the hinge strong, the middle left cardinal bifid, the pallial sinus short, linguiform, the cavity of the valves except near the beaks and margin stained with very dark purple, the inner margins finely crenulate. Length, 37; height, 28; diameter, 19 mm.

Indefatigable Island of the Galapagos group; a number of worn valves. Cat. No. 102457, U.S.N.M.

The young shells appear to be oval, the only well-preserved adult valve, which is figured, is distinctly cuneate. In general the species is more elongate than the other species of the coast and the sculpture is quite unlike any of the others, the nearest being *C. columbiensis*, which has channeled and regular sulci between flat ribs.

VENUS APODEMA, new species.

Plate XV, fig. 8.

Shell suborbicular, convex, white, concentrically ribbed with narrow, solid, hardly elevated riblets separated by narrower sulci; beaks very anterior, incurved, low, finely radially striated; anterior slope short with a small cordate lunule; posterior slope arcuate, with an elongated area bounded by a rounded ridge which does not interrupt the sculpture; interior white, the margins with fine obscure crenulation; pallial line with a short angular sinus; hinge normal, the corrugated area small and narrow. Height, 43; length, 47; diameter, 28 mm.

Humboldt Bay, Gulf of Panama, Arthur Schott. Cat. No. 6243, U.S.N.M.

A single somewhat worn valve was collected by Schott with numerous other beach shells, which he presented to the National Museum nearly fifty years ago. It has been named and figured, because of the interest attaching to the discovery of this genus in those waters, and because it seems certain that it does not agree with any already known species. It is very probable that the sculpture was considerably sharper when the shell was fresh and the concentric sculpture unworn, but it is evident that the latter never was sharply lamellar as in the Atlantic species.

MARCIA KENNERLEYI Reeve apud Carpenter.

Plate XIV, fig. 1.

A figure of a specimen obtained alive in the harbor at Sitka, Alaska, is included. Cat. No. 23441, U.S.N.M.

A worn valve of this species was collected by me at Carmel Bay, near Monterey, California, in 1866.

PAPHIA (PROTOTHACA) STAMINEA var. SULCULOSA, new species.

Plate XIV, fig. 2.

San Ignacio lagoon, Lower California; Henry Hemphill, Cat. No. 105421, U.S.N.M.

This form, through its modified sculpture, is so different from the ordinary type that it seemed best to figure it. Only with a large series can its relations to the type be fully appreciated.

LIOCYMA BECKII Dall.

Plate XVI, fig. 3.

Liocyma beckii DALL, Proc. Boston Soc. Nat. History, XIII, 1870, p. 257; Am. Journ. Conch., VII, 1871, p. 145, pl. XIV, fig. 7.

Plover Bay, eastern Siberia, at the western entrance of Bering Strait. Cat. No. 163110, U.S.N.M.

LIOCYMA VIRIDIS Dall.

Plate XV, fig. 1.

Liocyma viridis DALL, Am. Journ. Conch., VII, 1871, p. 146, pl. XIV, fig. 8.

Kyska Harbor, Great Kyska Island, in 8 fathoms, sand; W. H. Dall. Cat. No. 160904, U.S.N.M.

LIOCYMA SCAMMONI Dall.

Plate XVI, fig. 1.

Liocyma scammoni DALL, Am. Journ. Conch., 1871, VII, p. 145, pl. XIV, fig. 9.

Port Simpson, British Columbia; Capt. C. M. Scammon. Cat. No. 163121, U.S.N.M.

PSEPHIDIA LORDI Baird.

Plate XVI, figs. 5, 6.

Chione lordi BAIRD, Proc. Zool. Soc., 1863, p. 69, pl. II, fig. 10.
Psephis lordi CARPENTER, Proc. Acad. Nat. Sci. Phila. for 1865, p. 57.

Lituya Bay, Alaska, in 8 fathoms, sand; W. H. Dall. Cat. No. 163071, U.S.N.M.

The specimen figured is perhaps more trigonal than usual, others are slightly more produced behind.

PSEPHIDIA OVALIS, new species.

Plate XVI, fig. 4.

Shell small, white, polished, oval, subcompressed; surface with obsolete concentric threads near the anterior base, but over most of the disk smooth; beaks small and very low, at about the anterior third of the length; lunule elongated, extremely narrow, nearly as long as the anterior dorsal slope; escutcheon linear or none; interior white, the pallial sinus moderate, pointed; internal margin delicately striated; hinge well developed, like that of *P. lordi*, with three entire cardinals and no anterior lateral tooth. Length, 8.5; height, 6.5; diameter, 3.0 mm.

North side Catalina Island, California, in 16 fathoms gravel and sand; W. H. Dall. Cat. No. 163089, U.S.N.M.

The species is viviparous; some of those taken having as many as thirty young shells in the anal chamber. It is always distinguishable from *Psephis tantilla* (Gould) Carpenter by its hinge and oval form, and from *P. lordi* by its oval outline, compressed valves, and thinner shell. *Psephis tellimyalis* of Carpenter, 1864, is the nepionic young of a species of *Petricola*, and his *Psephis salmonea* bears the same relation to some other bivalve, apparently a species of *Tivela*, not *T. stultorum*.

NOTES.

Dosinia angulosa Philippi, through having the name of the Chinese province of Chi-li, latinized into *chiliense* by Deshayes, has been erroneously supposed to extend its range to South America.

The National Museum contains a valve of *Dosinia prostrata* said to have been dredged in the Gulf of California, but as the collector had also visited and collected on the coasts of China and Japan, I suspect a mixture of labels to be responsible for an obvious error. *Clementia gracillima* Carpenter, 1857, from Mazatlan, is an unidentifiable nepionic shell, less than a tenth of an inch in length.

The genus *Circe* does not occur on the west coast of America; even *Gouldia*, which might be expected, is unknown. Two shells described as *Circe margarita* and *C. subtrigona* by Carpenter, in 1857, from Mazatlan, are nepionic shells, which are so juvenile in their characters as to be impossible of identification at present. We may assume it to be certain that they do not belong to the genus *Circe*. *Circe nummulina* Lamarck, 1818, was listed from Central America by Sir E. Belcher, but his localities were notoriously not dependable. *Cytherea petechialis* Lamarck, 1818, is listed by Carpenter from Mazatlan, having been found among the Reigen shells, but it is certainly exotic, none having appeared from there for half a century. *Saxidomus brevisiphonatus* Carpenter, 1865 (and *Darina declivis* of the same date), have never been collected since they were described from the Vancouver region. I believe them to be exotics which were accidentally mixed with West Coast shells. Specimens supposed to be the *Saxidomus*, sent by West Coast collectors, have invariably proved to be mutations of *S. giganteus*. The name *Saxidomus squalidus*, given to a South American shell, probably a *Marcia*, has been frequently applied to the *S. giganteus*, following an error of Carpenter.

INDEX TO NAMES OF SUBDIVISIONS.

[Synonyms in italics.]

EXPLANATION OF THE PLATES.

PLATE XII.

EAST AMERICAN VENERIDÆ.

Fig. 1. *Dosinia* (*Dosinidia*) *discus* Say. Cat. No. 54094, U.S.N.M.; South Carolina; length, 70.0 mm.; p. 379.

2. *Tivela nasuta* Dall. Cat. No. 153377, U.S.N.M.; length, 33.0 mm.; Santa Marta, Colombia; p. 380.

3. *Tivela braziliana* Dall. Cat. No. 125468, U.S.N.M.; length, 40 mm.; Brazil; p. 381.

4. *Callocardia* (*Agriopoma*) *zonata* Dall. Cat. No. 92015, U.S.N.M.; length, 22.0 mm.; North Carolina; p. 381.

5. *Cytherea* (*Ventricola*) *strigillina* Dall. Cat. No. 95608, U.S.N.M.; length, 38.0 mm.; Key West, Florida; p. 381.

6. *Dosinia* (*Dosinidia*) *elegans* Conrad. Cat. No. 6120, U.S.N.M.; length, 68.0 mm.; Texas; p. 379.

PLATE XIII.

EAST AMERICAN VENERIDÆ.

Fig. 1. *Dosinia* (*Dosinidia*) *discus* Say, interior view. Cat. No. 54094, U.S.N.M.; length, 70 mm.; South Carolina; p. 379.

2. *Chione mazyckii* Dall. Cat. No. 92022, U.S.N.M.; length, 15.0 mm.; North Carolina; p. 382.

3. *Tivela abaconis* Dall. Cat. No. 103551, U.S.N.M.; length, 11.0 mm.; Abaco Island, Bahamas; p. 380.

4. *Transennella cubaniana* Orbigny. Cat. No. 54135, U.S.N.M.; length, 10.6 mm.; St. Croix, West Indies; p. 379.

5. *Transennella conradina* Dall, interior view, showing characteristic sulcations of the margins. Cat. No. 64437, U.S.N.M.; length, 11.0 mm.; West Florida; p. 379.

6. *Cytherea* (*Ventricola*) *callimorpha* Dall. Cat. No. 64292, U.S.N.M.; length, 15.5 mm.; Barbados; p. 382.

7. *Dosinia* (*Dosinidia*) *elegans* Conrad, interior view. Cat. No. 6120, U.S.N.M.; length, 68.0 mm.; Texas; p. 379.

PLATE XIV.

WEST AMERICAN VENERIDÆ.

Fig. 1. *Marcia kennerleyi* Carpenter. Cat. No. 23441, U.S.N.M.; length, 71 mm.; Sitka, Alaska; p. 406.

2. *Paphia* (*Protothaca*) *staminea* Conrad, variety *sulculosa* Dall. Cat. No. 105421, U.S.N.M.; length, 55.0 mm.; San Ignacio Lagoon, Lower California; p. 406.

3. *Callocardia* (*Agriopoma*) *catharia* Dall. Cat. No. 93638, U.S.N.M.; length, 52.0 mm.; Panama Bay; p. 402.

4. *Clementia solida* Dall. Cat. No. 126352, U.S.N.M.; length, 79.0 mm.; Topolobampo, Mexico; p. 401.

PLATE XV.

WEST AMERICAN VENERIDÆ.

Fig. 1. *Liocyma viridis* Dall. Cat. No. 160904, U.S.N.M.; length, 31.0 mm.; Kyska Harbor, Aleutian Islands; p. 407.

2. *Pitaria tomeana* Dall. Cat. No. 109220, U.S.N.M.; length, 24.0 mm.; Tome, Chile; p. 402.

3. *Cyclinella singleyi* Dall. Cat. No. 168817, U.S.N.M.; length, 39.0 mm.; Yaqui River delta, Gulf of California; p. 404.

4. *Cytherea* (*Ventricola*) *foveolata* variety *lepidoglypta* Dall Cat. No. 103286, U.S.N.M.; length, 41.0 mm.; Acapulco, Mexico; p. 403.

5. The same, vertical view, showing lunule and escutcheon.

6. *Cytherea* (*Ventricola*) *magdalenæ* Dall. Cat. No. 109214, U.S.N.M.; length, 42.0 mm.; Magdalena Bay, Lower California; p. 403.

7. *Cytherea* (*Ventricola*) *fordi* Yates. Cat. No. 120704, U.S.N.M.; length, 47.0 mm.; Catalina Island, California; p. 403.

8. *Venus apodema* Dall. Cat. No. 6243, U.S.N.M.; length, 47.0 mm.; exterior view of a somewhat worn specimen from Humboldt Bay, Gulf of Panama; p. 406.

PLATE XVI.

WEST AMERICAN VENERIDÆ.

Fig. 1. *Liocyma scammoni* Dall. Cat. No. 163121, U.S.N.M.; length, 20.5 mm.; Port Simpson, British Columbia; p. 407.

2. *Chione* (*Lirophora*) *obliterata* Dall. Cat. No. 11821, U.S.N.M.; length, 24.0 mm.; Humboldt Bay, Gulf of Panama; p. 405.

3. *Liocyma beckii* Dall. Cat. No. 163110, U.S.N.M.; length, 14.0 mm.; Plover Bay, near Bering Strait, Eastern Siberia; p. 407.

4. *Psephidia ovalis* Dall. Cat. No. 163089, U.S.N.M.; length, 9.0 mm.; Catalina Island, California; p. 407.

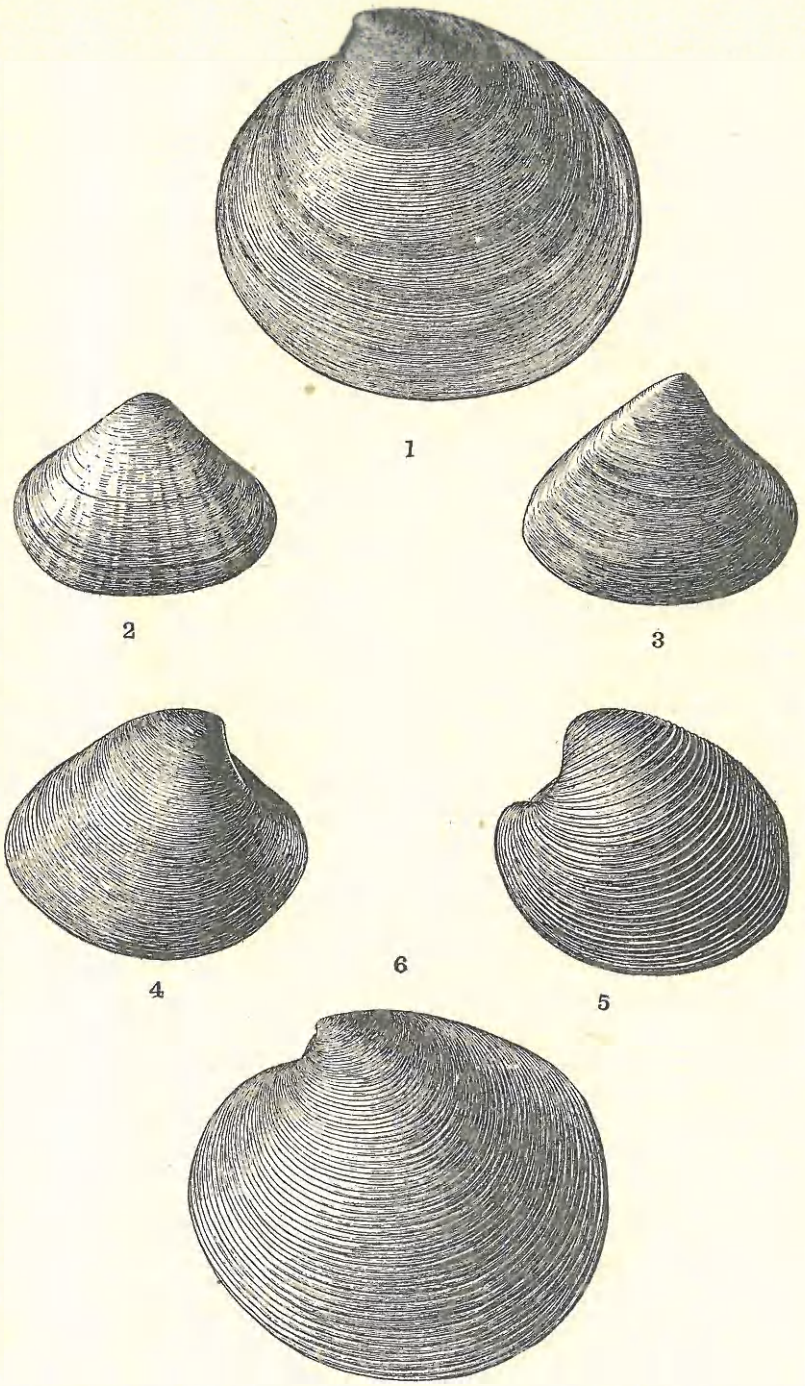
5. *Psephidia lordi* Baird. Cat. No. 163071, U.S.N.M.; length, 7.5 mm.; Kyska Harbor, Aleutian Islands; p. 407.

6. The same, umbonal view showing lunule.

7. *Chione* (*Lirophora?*) *schottii* Dall. Cat. No. 6226, U.S.N.M.; length, 14.0 mm.; Humboldt Bay, Gulf of Panama; p. 404.

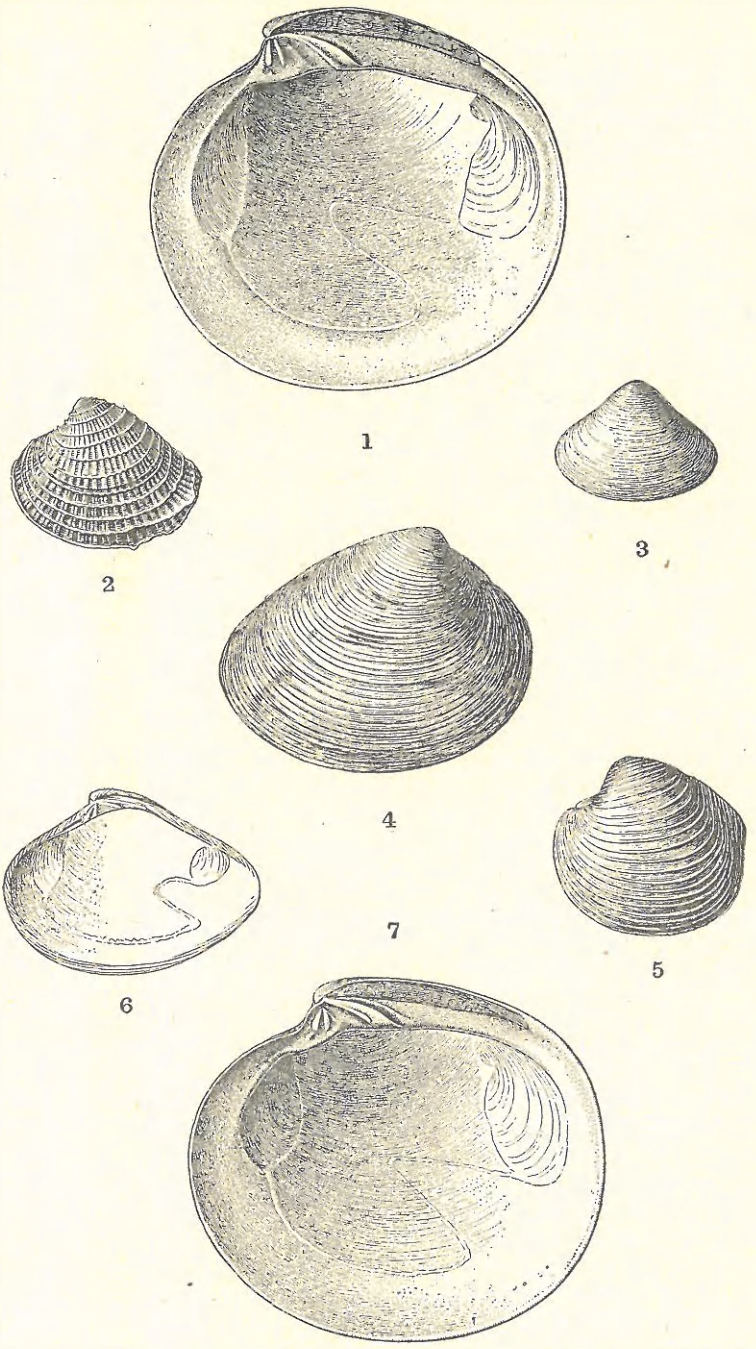
8. *Pitaria* (*Lamelliconcha*) *callicomata* Dall. Cat. No. 96388, U.S.N.M.; length, 47.0 mm.; Bay of Panama; p. 402.

9. *Chione* (*Timoclea*) *pertincta* Dall. Cat. No. 102457, U.S.N.M.; length, 37.0 mm.; Galapagos Islands; p. 405.



EAST AMERICAN VENERIDÆ.

FOR EXPLANATION OF PLATE SEE PAGE 410.



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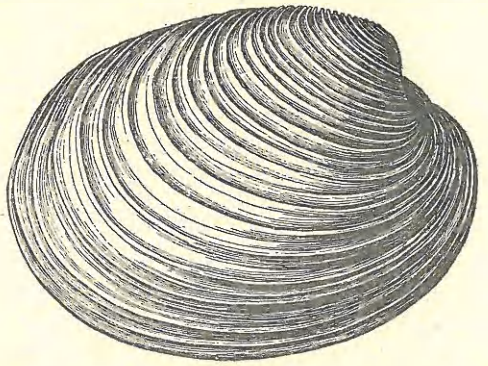

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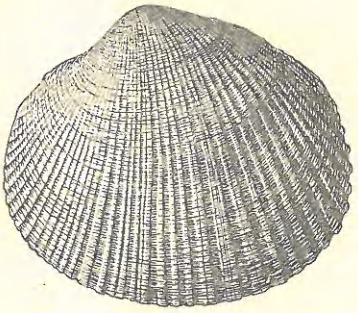

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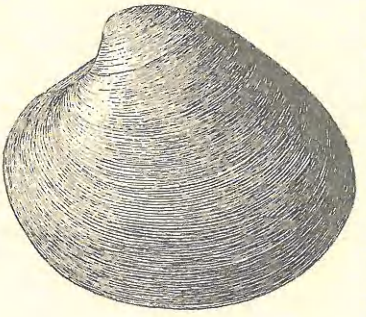

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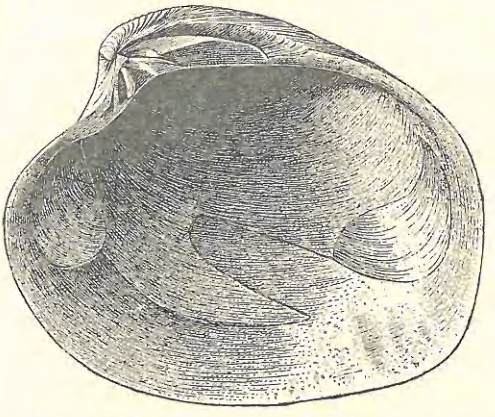
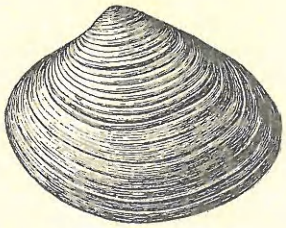


WEST AMERICAN VENERIDÆ.

FOR EXPLANATION OF PLATE SEE PAGE 411



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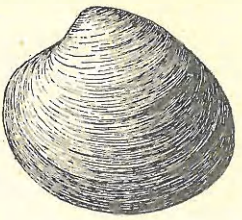

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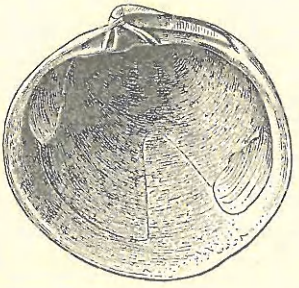

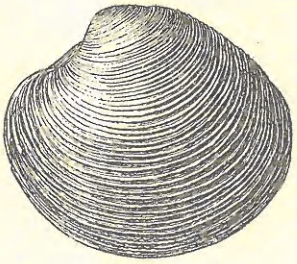

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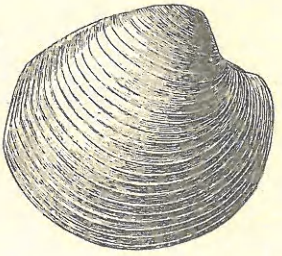

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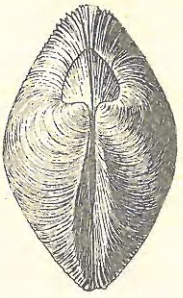

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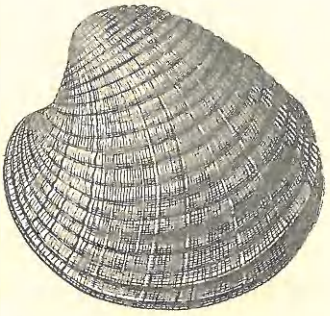

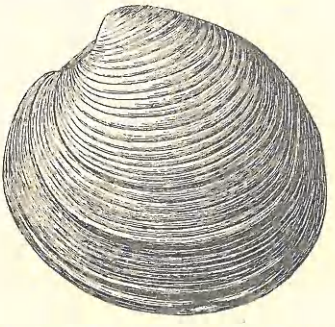

WEST AMERICAN VENERIDÆ.

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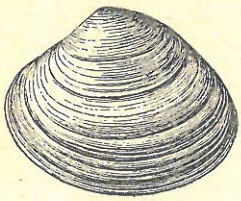

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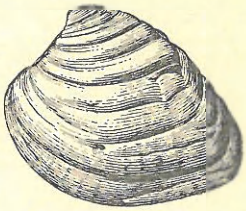

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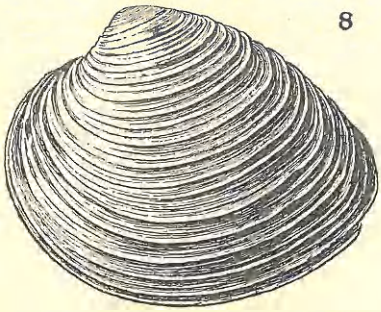

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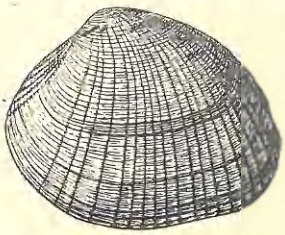

WEST AMERICAN VENERIDÆ.

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