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A
MONOGRAPH
OF THE
FRESH-WATER UNIVALVE MOLLUSCA
OF THE
UNITED STATES.

(IN CONTINUATION OF PROF. S. S. HALDEMAN'S WORK, PUBLISHED
UNDER THE ABOVE TITLE.)

Washington
BY GEORGE W. TRYON, JR.

TURBIDÆ.
PHYSADÆ.

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MONOGRAPH
OF THE
FLUVIATILE MOLLUSCA
OF THE
UNITED STATES.

P R E F A C E .

The following pages are devoted to the illustration and description of the fresh-water univalve mollusks inhabiting the United States, together with notices of some of the extra-limital species; and the work forms part of a series, which is intended to comprise a complete history of the mollusca of our country.

One volume of this series (that on the terrestrial shells*) has already been published, and the present volumes describe all the fluviatile families with the exception of the Strepto-

* A Monograph of the Terrestrial Mollusca of the United States. With Illustrations of all the Species. By Geo. W. Tryon, Jr. 8vo, 204 pp. 18 plates. Philadelphia, 1866-7.

matidæ (Melanians). The latter will form the subject of a future memoir.

Prof. S. S. Haldeman having liberally presented to the Conchological Section of the Academy of Natural Sciences of Philadelphia the remaining stock of his magnificent monographs on Turbidæ and Physadæ, the Section has determined to re-issue that work as one of its series of publications, and has confided to me the duty of preparing a continuation of it, to include all the species published during the past twenty-five years, as well as any changes that may have occurred in the nomenclature of Prof. Haldeman's species during the same period.

For the reasons fully stated in the preface to my work on Terrestrial Mollusca, I have avoided as much as possible the use of technical language; and I have also endeavored to render the descriptions of the species as concise as possible, by omitting to refer to characters which are common to all the species of a genus or higher group. In fact, my principal aim has been to make myself thoroughly *understood* not only by scientific men, but also

by collectors and amateurs, and thus to insure the determination of the species with ease and certainty.

Most of the shells have been figured from specimens in the collection of the Academy of Natural Sciences, but a few, not readily accessible to me, have been copied from the works of Messrs. Lea and Binney.

To Dr. Isaac Lea I am much indebted for the use of the original types of some of his species which had not been previously illustrated, and which I have thus been enabled to figure for the first time. I am also under great obligations to Dr. James Lewis, of Mohawk, New York, and others, for valuable assistance.

The synonymy accompanies the references to the plates. It will be noticed that two sets of numbers are used for paging. Those in brackets are in continuation of Prof. Halderman's paging.

Measurements are made in millimetres, 25 = 1 inch.

GEORGE W. TRYON, JR.

HALL OF THE ACADEMY OF NATURAL SCIENCES, }
March 25th, 1870. }

*Key to the Families of Fluvial Mollusca
inhabiting the United States.*

Order **PULMONIFERA.**

Section A.—Adelopneumona (inoperculata).
Includes both fluvial and terrestrial species.
Shell without operculum.

Sub-order **Limnophila.**

Amphibious and fluvial species. Head furnished with *two* tentaculæ, with eyes at their *bases*.

A few of these shells are considered terrestrial, because they inhabit land within reach of the tides.

Family **PHYSADÆ.**

Shell spiral, elongated or discoidal, or conical and non-spiral. Covered with a green epidermis. Outer lip of aperture simple.

Species belonging to this family inhabit the

fresh waters of all parts of the world. It is numerous represented in the United States.

Order **SCUTIBRANCHIATA**.

Sub-order **Podopthalma**.

Includes marine, and a few fluviatile species (Neretinæ). Head furnished with *two* tentacles and with eyes on separate pedicels. Shell spiral, operculate.

Family **NERITIDÆ**.

Shell generally semi-globose, spiral of few whorls, not umbilicated. Cavity simple from the absorption of the internal portions of the whorls.

Distribution tropical and sub-tropical.

Order **PECTINIBRANCHIATA**.

Sub-order **Rostrifera**.

Includes marine and fluviatile species. Head with a produced, contractile rostrum. Tentacles subulate.

** Operculate. Fluvialile.*

Family AMPULLARIIDÆ.

Rostrum bi-lobed in front, tentacles long and filiform, with eyes pedunculated at their outer bases. Mantle with an elongate siphon on the left side. Operculum annular. Shell generally globosely turbinate, spiral, large, aperture entire. Distribution tropical and sub-tropical.

Family VIVIPARIDÆ.

Rostrum entire in front, tentacles short, stout, tapering, with eyes on tubercles at their outer bases. Mantle simple in front. Operculum annular, the nucleus sometimes spiral. Shell turbinate, spiral, of smaller size, aperture entire. Distribution universal.

Family AMNICOLIDÆ.

Tentacles elongated, with eyes at their outer bases. Operculum sub-spiral or concentric. Shell small, globular or elongated, spiral. Aperture broadly oval, lip continuous. Generally umbilicated.

Inhabit fresh waters in all parts of the world.

Family VALVATIDÆ.

Tentacles elongated, with eyes at their outer bases. Foot bilobed in front. Operculum multispiral, corneous. Shell globular or depressed, spiral, aperture rounded, lip entire.

Inhabit fresh waters of temperate and subtropical countries.

Family STREPOMATIDÆ.

Rostrum entire or slightly notched in front, tentacles tapering, with eyes on tubercles at their outer bases. Mantle simple in front, the margin plain.* Operculum ovate, sub-spiral. Shell generally elongate, spiral, smooth, striate or tuberculate. Aperture more or less produced or notched in front.

Distribution.—The United States, but very few species extra-limital. Entirely confined to North America.

* The Melanidæ, or oriental species from which this family is separated, have a fringed mantle-margin.



Monograph of the Fresh-Water Univalve Mollusca
of the United States.

Family *VIVIPARIDÆ*, H. and A. Adams.

GENERA.

* Operculum concentric.

VIVIPARA, Montfort.*

** Operculum concentric, with spiral nucleus.

LIOPLAX, Troschel.

Genus *V I V I P A R A*, *Montfort*.

(For description of shell and animal see
Haldeman, *Paludina*, p. 1.)

In the year 1862 I proposed to divide this
genus into several subgenera, and these have

* Lamarck's *Vivipare*, 1809, cannot be quoted because
not Latinized. Montfort published in 1810.

since been used as genera by Mr. W. G. Binney in his recent monograph published by the Smithsonian Institution. I prefer to continue to regard these groups as subgenera, because some of the characters of the soft parts described by Mr. Binney are of very doubtful distinctive value in my estimation. I may particularly adduce the descriptions of the animals of *Vivipara* and *Melantho*.

“*Vivipara*. Foot of moderate size, thick, not produced beyond the snout. Colors very dark.” *Fig. 23, Binney's Viviparidæ.*

“*Melantho*. Foot large, rather thin, broad, much produced beyond the snout. Colors rather light,” etc. *Fig. 68, same work.*

Now either description will apply to either genus. When the animal is at rest description No. 1 will apply, but when it walks it becomes No. 2. Thus Say's *decisa* belongs to the genus *Vivipara* when quiescent, but has the remarkable faculty of walking and *reaching* into the genus *Melantho*!

Those who are curious about this matter,

and have not the facilities for observing the animal in action, can satisfy themselves by a comparison of Haldeman's figure of *Paludina decisa* at rest (Plate I, fig. 1) with Mr. Binney's figures above cited.

Thus, then, I divide *Vivipara* :

* Whorls regularly rounded, generally banded,
texture thin, umbilicate. *typical.*

Inhabits all parts of the world. The American species very evidently belonging to the European group.

** Whorls flattened around their upper portions, generally without bands, solid, nearly or quite imperforate.

A group peculiar to North America.

† Smooth. Subgenus *Melantho.*

†† Nodulous. " *Tulotoma.*

The following species belong to each group ; those described by Haldeman being in Roman type, spaced, and the species characterized more recently in italic :

VIVIPARA, *i n t e r t e x t a*, Say, *v i v i p a*

ra, Linn. (= *lineata*, Küster), Georgiana, Lea, Bengalensis, Hald. (= *Waltoni*, nob.) carinata, Val., inornata, Binney.

MELANTHO, subpurpurea, Say, ponderosa, Say, decisa, Say, genicula, Conrad, integra, Say, Texana, Tryon, De Campi, Currier, Nolani, Tryon, subsolida, Anth., coarctata, Lea, obesa, Lewis, rufa, Hald., Milesii, Lea, gibba, Currier, lima, Anthony, exilis, Anth., incrassata, Lea, Troostiana, Lea, Haleiana, Lea.

TULOTOMA, bim on ilifera, Lea.

It is a curious fact that the family Viviparidæ is not represented west of the Rocky Mountains by a single species (nor is it found at all in South America), although the Rissoidæ, Valvatidæ and Limnæidæ are all represented there.

TYPICAL.

* *Shell of uniform green color, without bands.*

† *carinate.*

VIVIPARA CARINATA, *Valenciennes.*

Hald., p. 27, t. viii.

This is to be expunged from the list of American species. Mr. Binney, having examined a specimen in the Jardin des Plantes, found it labelled in Valenciennes' own hand, "Philippines." It is decidedly of oriental aspect.

†† *Smooth.*

1. VIVIPARA INTERTEXTA, *Say.*

Hald., p. 31, t. x, f. 1—6.

This species appears to be widely distributed. Mr. Say's original locality was New Orleans, but I have received numerous fine specimens collected by Prof. D. S. Sheldon at Davenport, Iowa, and Mr. W. G. Binney announces it from South Carolina.

2. VIVIPARA INORNATA, *Binney*.

Plate 14, figure 3.

Shell globosely turbinate, thin, smooth, polished, narrowly perforate, apex perfect, whorls 5, sutures moderately impressed, lip large, broadly oval. Light olive color, white within the aperture.

Length 19, diam. 17 mill.

Chopatilo, Mexico.

This species is more elevated and not so globose as *intertexta*. It also differs from that species in having a smooth polished surface, *intertexta* being covered with close revolving lines.

3. VIVIPARA GEORGIANA, *Lea*.

Hald., p. 23, t. vii, f. 1—2.

Plate 14, fig. 5.

To the above-quoted description I may add that from *V. lineata*, Küst., it may be distinguished by its closer volutions, which are much

less convex. It occasionally occurs with four bands like the *lineata*. I have figured a shell (t. 14, f. 5) described by Shuttleworth as *Paludina Wareana*, which is without doubt referable to this species.

Florida, Georgia, South Carolina, Alabama.

** *Shell with four red revolving bands.*

3a. VIVIPARA GEORGIANA, *Lea.*

Var. *fasciata*. See description above, No. 3. Haldeman's figures 3, 4, plate 6, referred by him to *V. vivipara*, represent either this or a variety of *V. Waltoni*, but most probably the former.

4. VIVIPARA LINEATA, *Küster.*

Hald., p. 17, t. vi, figs. 1, 2; 5, 6., *sub nom. P. vivipara.*

This species was until recently confounded with *V. vivipara* of Europe. It is very much like it, but is constantly distinguished by the presence of an additional colored band, making

four. This difference was first detected by Küster, who described it as *V. lineata*, Valenciennes, a very different species; but the latter species being falsely attributed to North America, being in fact a synonym of *V. Bengalensis*, Lam., the name given will stand as Küster's. Mr. Binney, on the ground of the mistake referred to, and because also *lineata* is not an appropriate name for the species, imposes a new one, *V. contectoides*; but it would be productive of immense confusion to nomenclature to permit alterations because authors fancy that names are inappropriate,—for it is not to be denied that on such pretext many of the names heretofore proposed would require changing; names of comparison, particularly, would need altering. In the names of the *Viviparæ*, for example, an almost entire change might be effected, for on looking over the list of character-names I scarcely find a half-dozen that would not have been more characteristic of other species than those which bear them. After all, as Shakspeare says, "What's in a

I recognize *Vivipara viridis*, Hanley, because I am acquainted with the specimen if I did not know it by specimen, or description, the name would not aid all in identifying it, for *all* Viviparas are and fifty species are as green as *viridis* and of them more so. It will suit my purpose equally well whether the species be named *viridis*, *rufus*, *grandis* or *parvus*, so it has a name and one which, being founded on the principle of absolute priority, without any or any other limitation, shall not be changed for any fancied improvement.*

Printed out in the Proceedings of the Philadelphia Academy of Natural Sciences for the fact that four-banded species were American, and those with three bands European, that one species only has two bands (*bermondiana*, D'Orb., of Cuba,—and that these are distinguished from the Asiatic by color, the bands in the former being

Haldeman's very just remarks on specific nomenclature. *Hald.*, p. 19.

red, while in the latter they are green. Haldeman has correctly figured the species, but some of Mr. Binney's figures have either been drawn by oversight from the European *V. vivipara*, or else the artist has neglected to represent the fourth (lowest) band.

Prof. Haldeman's supposition that all the *Viviparæ* are viviparous is no doubt correct,—at least a large number of species are known to be so.



5. VIVIPARA WALTONII, *Tryon*.

Hald., t. vii, f. 3, 4, *sub-nom. P. Bengalensis*.

Plate 13, fig. 2.

Ovate-conic, moderately thick, spire moderately elevated, whorls 5—6, somewhat flattened above, more convex beneath; aperture small, oval, the lip scarcely covering the small perforation. Epidermis polished, light olive, with four dark revolving bands, within bluish, exhibiting the bands.

Length 22, diam. 17 mill.

St. John's River, Florida.

The whorls of this species are only slightly convex, closely revolving, with sutures but little impressed. It is the shell believed by Say and Haldeman to = *Bengalensis*, Lam.

Subgenus MELANTHO, *Bowditch*.

* *Banded, or reddish within.*

6. VIVIPARA SUBPURPUREA, *Say*.

Hald., p. 28, t. ix. \

8. VIVIPARA TEXANA, *Tryon*.

Plate 13, figure 3.

Shell solid, narrowly conic, light green colored, with faint bands; spire elongate, suture deeply impressed, apex obtuse; whorls 6, slightly convex; aperture small, suborbicular, equalling two-fifths the shell's length.

Length 28, diam. 15 mill.

Texas.

Distinguished from *V. subpurpurea* by having six whorls, which are much narrower than in that species. The spire is almost double the length of that of *subpurpurea*, and the epidermis is lighter colored.

8. VIVIPARA RUFA, *Haldeman*.

Hald., p. 3 of wrapper No. 3, t. 3, fig. 1.

Plate 12, fig. 12 (outline of deformed specimen.)

Shell ovate-elongate, smooth, polished, whorls 5, with well impressed sutures, apex entire and acute. Green, with frequently divided bands of red under the epidermis, within red.

Length 28, diam. 18 mill.

Western New York to Wisconsin. Georgia?

This species may be distinguished from *V. decisa* by its more polished surface and entire apex, and more particularly by its interior coloration.

***Not banded, spire short, form oval-quadrate.*

9. VIVIPARA TROOSTIANA, *Lea.*

Plate 15, fig. 3.

Shell ventricose-conical, thin, pellucid, smooth, perforate; spire short, sutures much impressed; whorls 4, convex; yellowish horn-color, white within the large rounded aperture.

Length 18, diam. 16 mill.

Tennessee.

More nearly related by form to *V. subpurpurea* than to any other species. My figure is drawn from the type specimen.

10. VIVIPARA HALEIANA, *Lea.*

Plate 15, fig. 5.

Shell ventricose-conical, nearly globose, rather thin, imperforate; whorls 4, very convex, the spire short and small, and suture well impressed. Reddish horn color, the large rounded aperture bluish within.

Length 13·5, diam. 10 mill.

Alexandria, La.

Smaller than *V. Troostiana*, of different form and darker color. Mr. Binney considers the two identical, but they appear to me to be quite distinct. I have never seen any specimens of either except those in Mr. Lea's cabinet.

11. VIVIPARA PONDEROSA, Say.

Hald., p. 13, t. iv.

Plate 14, fig. 4. Plate 15, fig. 6.

This species inhabits from Ohio to Iowa, and southward to Alabama. I have figured (fig. 4) an Alabama specimen as representing the var. *A* mentioned by Haldeman. *V. regularis*, Lea, is undoubtedly the young of this species; my figure (fig. 6) is drawn from one of Mr. Lea's types.

12. VIVIPARA NOLANI, *Tryon*.

Plate 12, figs. 10, 11.

Ovate, imperforate, thick, spire short conic or truncated; whorls 5, separated by a very deep suture making a rounded shoulder on each, aperture subpyriform, the inner lip very thick. Dark olivaceous, bluish or white within.

Length 33, diam. 24 mill.

Coosa River, Alabama.

Hitherto confounded with *V. ponderosa*, this species is readily distinguished in all stages of growth by its narrower and more sloping whorls and deep sutures.

13. VIVIPARA OBESA, *Lewis*.

Plate 13, fig. 6.

Obesely-ovate, very ventricose; whorls 5, convex, spire short-conic, sutures well impressed, aperture ovate. Dark olivaceous, bluish-white within the aperture.

Length 32, diam. 20 mill.

Ohio, Michigan, Western New York.

This species much resembles a half-grown *ponderosa*, but is more regularly oval in its outline and of lighter texture. There is no doubt of its being perfectly adult, and it is, I believe, a very good species, with characters intermediate between *V. ponderosa* and *V. integra*.

* * * *Shell geniculate.*

14. VIVIPARA GENICULA, *Conrad.*

Hald., p. 15, t. 5.

This species is very widely distributed in the far southern States, and seems nearly to replace *V. integra* and *decisa*. Mr. W. G. Binney suggests that it is a deformed *decisa*, but I have seen numerous specimens from many localities, and they present a uniformity of appearance that can be due to nothing less than specific force.

* * * *Shell gibbous.*

15. VIVIPARA GIBBA, *Currier.*

Plate 12, figs. 3 to 7.

Shell rhombic, imperforate, rather thick; whorls 5, well rounded, with impressed sutures, the last subangulate on the periphery; aperture rhombic, half the length of the shell. Greenish-brown, polished, rufous within.

Length 27, diam. 20 mill.

Michigan, Western New York.

The largest figure is taken from a specimen from Mohawk, N. Y., sent to me by Dr. Jas. Lewis, who suggests that it is a monstrosity of *V. rufa*. Fig. 3 is from the type. Although allied to *rufa* in color, I am inclined to accept it as a species, as the form appears to me to be persistent.

* * * * Shell elongate-conical, green.

16. VIVIPARA DECISA, Say.

Hald., p. 4, t. i, p. 10, t. iii (*integra*).

Plate 12, fig. 8 (deformed). Plate 12, fig. 9 (reversed).

Plate 13, fig. 5 (*Paludina Milesii*, Lea).

As indicated above by the references to figures, I consider *V. integra* to be identical with *V. decisa*. The principal differences are that the former attains a larger size and the tip of the spire is never eroded; but the same differences occur in *Lioplax subcarinata*, the specimens from the western waters being uniformly larger, more perfect in the spire, and more solid. *Paludina Milesii*, Lea, I cannot separate as a species, as it does not exceed the usual range of variation in form of *V. decisa*.

Massachusetts to Iowa, and southwards to Alabama.

17. VIVIPARA SUBSOLIDA, *Anthony*.

Plate 12, figs. 1, 2.

Shell very thick, imperforate, ovate-elongate, spire much elevated, composed of 6—7 convex whorls flattened somewhat superiorly; aperture broadly ovate, about one-third the total length of the shell, parietal wall with a heavy callous deposit.

Length 50, diam. 27 mill.

Illinois, Iowa.

This is the most ponderous species of the genus, being far heavier than *V. ponderosa*. It is sufficiently distinguished by its elevated spire and proportionally small aperture. Fig. 2 represents a young specimen.

18. VIVIPARA INCRASSATA, *Lea*.Plate 15, fig. 7, and Plate 14, fig. 6 (*decapitata*, Anth.)

Shell smooth, decorticated, thin, imperforate, aperture small, oval, the parietal wall much

thickened above. Green, white or bluish within.

Length 17, diam. 14 mill.

Alabama, Tennessee.

This shell does not appear to resemble closely any of the other species, although it might perhaps be a much eroded *decisa*. It is certainly not referable to the genus *Lithasia*, as Mr. W. G. Binney has supposed. The *V. decapitata*, Anth., appears to be the same species.

19. VIVIPARA DECAMPI, *Currier*.

Plate 14, figs. 1, 2.

Shell ovate-oblong, imperforate, thick, with coarse wrinkles and longitudinal striæ, decussated by delicate revolving striæ; spire elevated, truncated; remaining whorls three, those of the spire somewhat flattened, the last more convex, with a scarcely perceptible median angle. Aperture ovate, narrow. Greenish olive, with dark broad bands when young, uniformly dark olive when old, bluish within.

Length 35, diam. 22 mill.

Alabama.

Mr. Binney remarks that (Monog., p. 115) "All but the one drawn in Fig. 227 (my fig. 1) could not be distinguished from *Melania* without the presence of the operculum, thus furnishing another example of the impossibility of ascertaining from the shell alone the generic position of some species." I examined the specimens, and could not see any resemblance to *Melania*. I think their appearance decidedly *Viviparish*.

20. VIVIPARA LIMA, *Anthony*.

Plate 13, figs. 8, 9, 10.

Shell ovate, rather thin, dark green, whorls 6, flattened, angulate at the middle and bearing coarse irregular, distant, revolving striae and angles, sutures distinctly impressed, aperture narrow, nearly half the entire length of the shell, umbilicus generally covered. Light olive colored, bluish within.

Length 31, diam. 19 mill.

South Carolina.

This is a very distinct species, and can scarcely be confounded with any other. Its conical form, flattened whorls, and revolving angles, as well as its peculiar color, are its most prominent characters. There is a remarkable uniformity of appearance in the specimens that I have examined.

21. VIVIPARA COARCTATA, *Lea.*

Plate 15, fig. 1.

Plate 13, fig. 7 (*Vivipara exilis*, *Anth.*)

Shell ovate, moderately thick, whorls 7, convex, sutures well impressed, spire elevated, narrow, aperture narrowly ovate, small, the lip-extremities connected by a deposit on the columella which nearly covers the umbilicus. Surface marked by slight growth-lines, the periphery sometimes very slightly angulated.

Length 30, diam. 18 mill.

Mississippi, Louisiana, Alabama?

The peculiar constriction of the upper portion of the lip as shown in the figure (Plate 13, fig. 7), is very usual in adult specimens. Mr. Lea described from a single *deformed* specimen (Plate 15, fig. 1) many years ago, without giving a figure; it was therefore impossible for Mr. Anthony to avoid making a synonym. I think the Alabama locality somewhat doubtful.

Subgenus T U L O T O M A, *Haldeman*.

22. VIVIPARA BIMONILIFERA, *Lea*.

V. magnifica, Haldeman, Plate 11.

This species has only as yet been found in the waters of Alabama.

Genus LIOPLAX, *Troschel.*

Synonym, *Haldemania*, Tryon.

1. LIOPLAX SUBCARINATA, *Say.*

Haldeman, p. 8, t. 2.

Plate 13, fig. 1.

Haldeman's figures 1 and 2 represent the full size of eastern forms of this species, but in the west it attains a larger size and is more ponderous; it also differs in color, being much lighter. It has not been reported south of the Potomac and Ohio Rivers, but extends from Pennsylvania to Iowa.

2. LIOPL. CYCLOSTOMATIFORMIS, *Lea.*

Plate 15, fig. 4.

Plate 13, fig. 4 (*Paludina Elliottii*, Lea).

Cylindrically-pupæform, moderately thick, surface marked by small growth lines, which are flexuous; whorls 5 to 7, well rounded, spire exerted, sutures deeply impressed, some-

times almost channelled, aperture small, broadly ovate, umbilicus partly or entirely closed. Light olive color, blue within.

Length 20, diam. 8 mill.

Georgia and Alabama.

I agree with Mr. Binney in considering Mr. Lea's *P. Elliottii* to be identical with this species. The carina is obsolete or nearly so on the lower whorls, but is more or less distinct on those of the spire.

3. LIOPLAX SPILLMANII, *Lea*.

Plate 14, fig. 7. Plate 15, fig. 8.

Shell subelliptical, rather thin, imperforate, whorls 5, biangulated around the middle, the angles carinate, sutures well impressed; aperture small, narrowly ovate, surface closely covered with revolving striæ. Light green, bluish within.

Length 33, diam. 13 mill.

Jackson County, Mississippi.

Very distinct from having a plane surface girdling each whorl, caused by the double carina.

4. LIOPLAX COOSAENSIS, *Lea*.

Plate 15, figure 2.

Shell subglobose, turbiform, smooth, whorls five, very convex, spire short, sutures deeply impressed, aperture moderate, nearly round, narrowly umbilicated. Very pale green, whitish within.

Length 16, diam. 15 mill.

Coosa River, Alabama.

The form of this species is remarkably distinct from that of either of its congeners. It is rare, for no specimens have been obtained since the original lot, over twenty-five years ago. The top of the whorls is almost tabular, and it is somewhat doubtful whether the species is not distorted from its normal growth and forcibly compressed in its axis. Thus, it might in such case even prove to be identical with one of the two species immediately preceding this. In this case, as in many others, conchology needs more light! Who will illuminate?

Family *AMPULLARIIDÆ*.Genus *AMPULLARIA*, *Lamarck*.

(Haldeman, Monog. p. 1.)

1. *AMPULLARIA DEPRESSA*, *Say*.

Hald., p. 5, t. 1, 2.

Inhabits Georgia and Florida.

2. *AMPULLARIA FLAGELLATA*, *Say*.

Plate 16, fig. 1. (Hald., p. 10.)

Inhabits Mexico.

SPURIOUS SPECIES.

Ampullaria globosa, Swainson, Hald., p. 8.
Inhabits India.

Ampullaria urceus, Müller, Hald., p. 11.
Does not inhabit Mexico, as asserted by Haldeman. It is South American.

? *Ampullaria intertexta*, Say, Hald., p. 11, is surely a *Vivipara*.

Family *NERITIDÆ*.Genus *NERITELLA*, *Humphrey*.

Shell globular, or globose-conical, thin, with a horny epidermis, and a large semilunar aperture, the inner lip of which is straight and flattened with a smooth or denticulated margin, outer lip-margin rounded, simple, acute.

Operculum sub-spiral, testaceous, smooth on the exterior surface, with two apophyses or ridges, of which the upper one is short, and the lateral one in the form of an arched rib.

Animal. Head with a short, broad muzzle, slender tapering tentacles, with pedunculated eyes at their outer bases; foot oblong, triangular, the sides simple.

Distribution.—Tropical and subtropical.

Most of the species belonging to this family and genus are marine, many of them, however, inhabiting brackish water. Of the six species described and figured in Mr. Binney's recent publication on the "Land and Fresh-Water Shells of North America,"* *three*, viz. : *cassicu-*

* Smithsonian Miscellaneous Collections. 8vo. Wash-

lum, *reclivata* and *picta* are marine, and therefore should not have been included; *one*, *Jayana*, is fluviatile, but belongs to the European group undoubtedly; and *one*, *Californica*, is marine, and belongs to the Philippine Islands group of species. The remaining species I describe.

1. NERITELLA SHOWALTERI, *Lea*.

Plate 16, fig. 2.

Shell smooth, rounded, semi-transparent, yellowish horn-color; spire very much depressed; sutures slightly impressed; whorls three, inflated; aperture semirobund; inner lip dilated, white, thickened, without teeth and incurved; outer lip acute, dilated and thin. Operculum —?

Diameter 5, alt. 4·5 mill.

Coosa River, Shelby Co., Alabama.

A very rare species, of which Dr. Lea only received four specimens, one of which he obligingly presented to the Academy of Natural Sciences.

Family *VALVATIDÆ*.

Genus *VALVATA*, *O. F. Miller*.

For description of genus, see Haldeman's Monog., p. 1.

1. *VALVATA TRICARINATA*, *Say*.

Hald., p. 3, t. i, figs. 1—4.

Inhabits from New England to Virginia, and westward to Iowa. Great Slave Lake.

In favorable localities this species attains a much greater size than the figures indicate.

2. *VALVATA SINCERA*, *Say*.

Hald., p. 6, t. i, f. 6—10.

Inhabits from Vermont to Pennsylvania, and westward to Iowa. Mackenzie's River, Great Slave Lake. I scarcely think this distinct from the above, the degree of carination varying so greatly. It must be regarded as a doubtful species.

3. VALVATA HUMERALIS, *Say*.

Hald., p. 9. Plate 16, fig. 3.

Shell subdiscoidal, spire convex, not much elevated; volutions three and a half, with plane shoulders. Aperture rounded, umbilicus moderate. Color light green.

Diam. 4, alt. 2·75 mill.

Mexico.

I figure and describe this species from the single type specimen in the museum of the Academy of Natural Sciences. The plane shoulder has the appearance of being a monstrosity. It has been surmised that this species is identical with my *Valvata virens*, but until more specimens are obtained no satisfactory conclusion can be arrived at. It is certain that Mr. Say's description will not apply to my species unless it is understood that the plane upper surface of the whorls is only the result of abnormal growth. The shell appears to me to differ much more from *virens* than it does from *tricarinata*.

4. VALVATA VIRENS, *Tryon*.

Plate 16, fig. 4.

Shell turbiniform, consisting of four well-rounded whorls; spire elevated, apex acute, sutures deeply indented, periphery almost angulated; umbilicus very wide; aperture oval or nearly round, the peristome merely touching the body above. Surface closely striate. Color varying from brilliant to dark green.

Alt. 5, diam. 5 mill.

Clear Lake, and other localities in California; Lake Utah.

Darker in color, and more turbiniform than either of the preceding species.

Subgenus L Y O G Y R U S, *Gill*.

Shell elongated, whorls convex, the last partially disjointed from the spire; aperture rounded.

Proposed by Prof. Theo. Gill as a distinct genus, but until we obtain further information relative to the anatomy and habits of the animal, I think it better to retain it as a subgenus of *Valvata*.

5. VALVATA PUPOIDEA, *Gould*.

Hald., p. 10, t. 1, figs. 11—13.

This species has not been detected elsewhere than in the vicinity of Boston, Mass.

Family *AMNICOLIDÆ*.*(Amnicola, Hald., Turbidæ, p. 4.)*

GENERA.

A. *Shell smooth.*

Shell elongated, perforate, smooth,

BYTHINELLA.

Shell turbinate; whorls very convex, umbilicate; aperture round; peristome continuous, acute, AMNICOLA.

Shell elongated, perforate, smooth, very convex; aperture round; peristome continuous, slightly expanded or reflected. Amphibious. Animal, foot with lateral sinuses,

POMATIOPSIS.

Shell heliciform, thick; aperture oblique; umbilicus large, with an angulated margin,

COCHLIOPA.

Shell subglobular, thin; spire short; aperture large, half-round; peristome not continuous;

margin in one plane, slightly perforate. Atlantic coast of United States, SOMATOGYRUS.*

Shell subglobular, thick, smooth, imperforate; aperture ovate, outer lip diffuse and projecting anteriorly, so that the peristome is not continuously in the same plane. Pacific slope of United States, . . . FLUMINICOLA.

B. *Shell sculptured.*

Shell elongated, carinated or plicated, perforated; aperture small, effuse and sinuated at the base, . . . TRYONIA.

* I do not think that Dr. Stimpson's genus *Gillia* can be separated from *Somatogyrus*. The lingual dentition does not in my opinion afford a sufficiently reliable distinctive character, and I am not even entirely satisfied that the type of the latter—*S. depressus*, nob.—is specifically distinct from *Melania integra*, Say, which Dr. Stimpson supposes to belong to his genus *Gillia*.

Genus BYTHINELLA, *Moq.-Tand.*

A. *Southern species.*

1. BYTHINELLA ATTENUATA, *Hald.*

Hald., p. 22, t. 1, fig. 13.

No other locality than the single one cited by Haldeman has occurred. It is very probable that it is only a very elongated variety of *B. Nickliniana*, Lea.

2. BYTHINELLA NICKLINIANA, *Lea.*

Hald., p. 21, t. 1, fig. 12.

Inhabits streams connected with the Susquehanna River in Pennsylvania, also various localities in Maryland and Virginia west of the Blue Ridge Mountains. The areas of distribution of all the species of this genus appear to be very circumscribed.

3. BYTHINELLA TENUIPES, *Couper*.

Hald., p. 23, t. 1, figs. 14, 15.

In the collection of the Academy at Philadelphia are preserved specimens of this species from Bohemia, Delaware,—the only known locality besides the original one.

4. BYTHINELLA FLORIDANA, *Frauenf.*

Plate 16, fig. 5.

Shell turbinate, thin, having four well-rounded whorls rapidly increasing in diameter; spire conical, aperture small, round; umbilicus narrow and deep. Dark brown.

Alt. 2·6, diam. 2 mill.

Florida?

The locality is very doubtful, the specimens in the Vienna museum having the word Croatia written on the label and afterwards stricken out. Two specimens in the collection of the late Hugh Cuming were said to have been received from Florida. The shell has much the

same form as my *B. Binneyi*, but is rather shorter and more conical. Specimens from the author in the Philadelphia collection have decidedly an European aspect, and I suspect that the species will not be detected in Florida.

5. BYTHINELLA MONROENSIS, *Frauenf.*

This is described as a long narrow species, with long mouth, five and a half whorls, greyish green, polished. From Lake Monroe and other localities in Florida. I have never seen the species, and as it has not been figured I am unable to give any opinion respecting it. It is compared with the *Jamaicensis* of Adams. Alt. nearly 4 millimetres, diameter 2.1 mill.

B. *Northern species.*

6. BYTHINELLA OBTUSA, *Lea.*

Plate 16, fig. 6.

“Shell subcylindrical, rather thin, dark green, smooth, slightly perforate; spire short;

at the beaks very obtuse ; sutures impressed ; whorls four, convex ; aperture small, nearly round."

Alt. 2·5, diam. 1·7 mill.

Western New York, Ohio to Illinois, Michigan.

This species is readily distinguished from its congeners by its pupæform truncate apex. Illinois specimens in the Philadelphia collection are rather larger than the above average dimensions.

C. *West Coast Species.*

7. BYTHINELLA INTERMEDIA, *Tryon.*

Plate 16, fig. 7.

Shell elongately turbinated, consisting of over four very convex whorls ; spire elevated, suture profound, apex obtuse ; body whorl well rounded ; aperture small, nearly round ; umbilicus narrow. Color dark green.

Alt. 5, diam. 3·3 mill.

Owyhee River, S. E. Oregon.

8. BYTHINELLA BINNEYI, *Tryon*.

Plate 16, fig. 8.

Shell minute, elongated, whorls four to five, apex somewhat obtuse; aperture ovate or nearly suborbicular, both margins rounded; umbilicus very small. Color light horn, translucent.

Alt. 3, diam. 1.6 mill.

Bolinas, California.

A narrow, smaller, more elongate and more fragile form than the preceding.

9. BYTHINELLA SEEMANI, *Frauenfeld*.

Plate 16, fig. 9.

Shell elongate, very narrow, whorls five and a half, convex; aperture very small, oval; umbilicus narrow. Greyish-green, translucent.

Alt. 4, diam. 1.8 mill.

Durango, N. W. Mexico.

Narrower than the preceding species.

Genus AMNICOLA, *Gould & Haldeman.*

A. *Species of the Atlantic and Middle States.*



1. AMNICOLA PORATA, *Say.*

Hald., p. 13, t. 1, fig. 8.

It is by no means certain that this species is distinct from *A. limosa*, Say. Haldeman's figure 6, "*limosa*," I have always regarded as a form of *porata*, but the forms vary so much that the distinction appears to be quite arbitrary. The species or form *porata* inhabits from New York to Utah, and far northward into British America, but it does not appear to extend into the Southern States; indeed, the genus appears to be nearly restricted to the area north of the Ohio River.

2. AMNICOLA LIMOSA, Say.

Hald., p. 10, t. 1, figs. 1, 5, 6?

Plate 17, fig. 1 (*A. Schrökingeri*, Fr.)

Plate 17, fig. 2 (*A. parva*, Lea).

Plate 17, fig. 3 (*A. orbiculata*, Lea).

Extends from British America to Virginia, and westward to Iowa. In the middle Atlantic States it is the most numerous in specimens of any species of the genus.

As stated above, it is doubtful whether Haldeman's figure 6 should be applied to this species, even figure 5 being broader than the average of specimens, which is better represented by my fig. 1, which Frauenfeld has unfortunately described as distinct, being misled probably by Haldeman's illustrations.

Neither of Mr. Lea's species differ from usual forms of *limosa*.

3. AMNICOLA PALLIDA, *Haldeman*.

Hald., p. 12, t. 1, fig. 7.

Additional localities, Kennebec River, Maine; Little Lakes, New York.

The shell is not so transverse as *limosa*, and the umbilicus is much narrower than in that species.

4. AMNICOLA DECISA, *Haldeman*.

Hald., p. 7, t. 1, figs. 2, 3.

This species has been detected in the Susquehanna, Schuylkill and Potomac Rivers. The smaller size and nearly imperforate base will distinguish it from the preceding.

5. AMNICOLA GALBANA, *Haldeman*.

Hald., p. 15, t. 1, fig. 9.

This species only occurs fossil at White Pond, in Sussex County, New Jersey. It should not have been included in Haldeman's Monograph.

AMNICOLA.

AMNICOLA CINCINNATIENSIS, *Anth.*

Hald., p. 9, t. 1, fig. 4.

inhabits from Western New York and Pennsylvania to Illinois. Walnut Creek, Kansas. Rocky Mountains?

The specimens from Walnut Creek and Rocky Mountains are larger and more robust, at one time I contemplated describing them as *A. Scarboroughi*; but I am now convinced that they are not distinct. Specimens have been distributed under my MSS. name, I would not allude to it here.

7. AMNICOLA GRANA, *Say.*

Plate 17, fig. 4.

Hald., p. 17.

Haldeman evidently was not acquainted with this species, but it is not uncommon around Philadelphia. The species appears in many local catalogues, but in most cases I be-

lieve the young of other species have been mistaken for it, and I think it probable that the habitat is quite restricted. I have examined Amnicolæ bearing this specific name from various localities, but invariably found them to be—something else.

B. *Species of the Pacific States.*

8. AMNICOLA LONGINQUA, *Gould.*

Plate 17, fig. 5.

“Shell small, elongate-ovate, smooth; apex obtuse; whorls five, rounded; suture deep; aperture elliptical, rounded posteriorly; columella very arcuate, subperforate.”

Alt. 3, diam. 2·5 mill.

Colorado Desert, Cal.

Resembles *Cincinnatiensis* in general aspect, but the outline of the spire is more convex and the aperture is more appressed to the body.

9. AMNICOLA TURBINIFORMIS, *Tryon*.

Plate 17, figure 6.

Shell ovate, turbinated; whorls very convex; sutures impressed, spire obtuse at apex; nearly four whorls; body large, well rounded, a little angulated on the periphery; aperture widely ovate; umbilicus narrow. Color dark green, light blue within the aperture.

Alt. 3·3, diam. 3 mill.

N. E. California and S. W. Oregon.

This species resembles *Cincinnatiensis*, but is smaller and more solid, with shorter spire, smaller umbilicus and darker color. It also differs in the periphery being slightly angled.

Genus P O M A T I O P S I S, *Tryon*.

1. POMATIOPSIS LAPIDARIA, *Say*.

Hald., p. 18, t. i, f. 10.

Occurs from Eastern New York to Iowa, and southward to Missouri and Georgia.

2. POMATIOPSIS LUSTRICA, *Say*.

Hald., p. 16.

Plate 17, fig. 7.

Haldeman suggests that this is the young of *P. lapidaria*, and an examination of the type specimen in the Academy's collection at Philadelphia leads me to think it probable that he is correct in his surmise. *Bythinella obtusa*, Lea, and other species, are occasionally distributed by collectors under the above name.

3. P. CINCINNATIENSIS, *Lea*.

Hald., p. 19, t. i, fig. 11.

Inhabits from Western New York to Minnesota and Iowa, and southwards to the Ohio River.

This species was first described as a *Cyclostoma*, under the above specific name, by Dr. Lea, in Oct., 1840, but upon referring the shell to the genus *Amnicola* it became necessary to

change the name, because in January, 1840, Mr. John G. Anthony described an *Amnicola* under the same name,—which of course had priority. Mr. Anthony suggested "*Sayana*" for Dr. Lea's species, and under that name it has been hitherto known. But the species differs generically from *Amnicola*, and as Dr. Lea's name is thus again capable of being used, I restore it.

The animal of *Pomatiopsis* prefers damp locations in the vicinity of streams, but does not, like the *Amnicola*, live habitually under water. It is an air-breather, but possessed of a true gill. Its locomotion is made by first protruding and attaching the snout, then carrying the front of the body forward, and finally drawing the posterior parts after,—very different from the gliding motion of the *Amnicolæ*. The shell of *Pomatiopsis* is elongated like that of *Bythinella*, but differs in the margin of the lip being reflected, presenting a very striking resemblance to the European terrestrial genus *Pomatias*,—whence the generic name.

Genus COCHLIOPA, *Stimpson*.1. COCHLIOPA ROWELLII, *Tryon*.

Plate 17, fig. 8.

Shell depressed, wider than high, consisting of $3\frac{1}{2}$ whorls, which are regularly convex and rapidly enlarging; spire small, but little elevated, apex acute, sutures well marked; base convex, except that the region surrounding the umbilicus is flattened and inclining towards the axis, its outer boundary, consequently, is marked by an angle; umbilicus small, but very distinct; aperture half ovate, the labrum well rounded and thin, the labium but slightly rounded, thickened, elevated from the body whorl, forming an acute angle with the labrum above, and not impinging on the umbilicus. Color yellowish-green. Operculum paucispiral.

Alt. 2.5; diam. maj. 4, min. 3 mill.

Clear Lake, California.

Genus SOMATOGYRUS, *Gill.*

1. SOMATOGYRUS ALTILIS, *Lea.*

Plate 17, fig. 9.

Shell subglobose, rather thin, light green or horn-color; spire short, apex acute; whorls 4, well rounded; aperture large, ovate-orbicular.

Alt. 8, diam. 6.5 mill.

Eastern Pennsylvania, Potomac River, Santee Canal, South Carolina.

This shell is very numerous in the vicinity of Philadelphia. It is the same as the species described by Haldeman as *Leptoxis crenata*.

2. SOMATOGYRUS SUBGLOBOSUS, *Say.*

Plate 17, figs. 10, 11.

Haldeman, *Paludina*, t. 10, figs. 7, 8.

Subglobose, horn color, whorls 4, rounded, spire short conical, suture very much impressed; aperture large, oval-orbicular, umbilicus rounded.

Alt. 8, diam. 10 mill.

Ohio River and tributary streams ; Wisconsin.

This species is larger, and the spire is more conical and sutures more deeply impressed than in the *altilis*. The whorls are more convex, and the umbilicus visible, although narrow.

Melania isogona, Say, is the same species, and *Paludina pallida*, Lea (my figure 11) is the young.

3. SOMATOGYRUS DEPRESSUS, Tryon.

Plate 17, fig. 12.

Shell orbicular, sub-hyaline ; whorls four, convex, the last large, equaling five-sixths the length of the entire shell ; umbilicus narrow ; aperture semicircular, labrum appressed within ; suture impressed.

Alt. and diam. 4 mill.

Mississippi River at Davenport, Iowa.

Differs from *S. subglobosus* in being smaller, and in the narrower aperture, of which the

inner lip is scarcely curved. It is somewhat larger than *S. integer*, but may prove to be only a variety of it.

4. SOMATOGYRUS CURRIERIANUS, *Lea*.

Plate 17, fig. 13.

“Shell smooth, suborbicular, thin, yellowish horn-color; spire depressed; sutures impressed; whorls four, geniculate above; aperture sub-constricted, half-moon shape, transparent within; outer lip acute, expanded, bent backward; columella thickened, broad and pressed in.”

Alt. 5, diam. 4·8 mill.

Huntsville, Alabama; Milwaukie, Wis.

Differs from all the other species in its broad, heavy deposit on the columella.

The specimen I figure, from Milwaukie, is that measured above, and is larger than Mr. Lea's specimens from Alabama.

5. SOMATOGYRUS AUREUS, *Tryon*.

Plate 17, fig. 14.

Shell subglobose, spire short, suture well impressed, apex obtuse; aperture pyriform, broadly rounded below; columella lip slightly reflected and appressed, scarcely covering the narrow umbilicus. Color golden yellow.

Alt. 4·5, diam. 4 mill.

Tennessee River.

This species much resembles *S. integer*, Say, with which at first I had confounded it. My closer attention was directed to it on account of the difference of color. *Integer* has proportionally a smaller spire, and the whorls are not so well rounded, and, consequently, suture not so well impressed.

6. SOMATOGYRUS PARVULUS, *Tryon*.

Plate 17, fig. 15.

Shell very small, globose, rather solid, consisting of four convex whorls; spire small,

apex acute ; body whorl well rounded, with aperture ovate, broadly rounded below ; pillar lip slightly reflected, but not quite covering the umbilicus. Dark olive-gray.

Alt. 3, diam. 2·5 mill.

Powell's River, E. Tennessee ; Stephenson, Ala.

With the same number of whorls as *S. integer*, Say, this species is much smaller and more solid.

7. SOMATOGYRUS INTEGER, *Say*.

Plate 17, fig. 16.

“Subglobose, horn color, volutions rather more than three, rounded, obsoletely wrinkled ; spire very short, less than half the length of the aperture, suture rather deeply impressed ; body whorl large, aperture dilated ovate, acute above ; columella flattened, polished ; labrum regularly rounded ; base regularly rounded ; umbilicus none.

Alt. 5, diam. 4·5 inch.

Inhabits the Ohio river and tributaries.

Genus FLUMINICOLA, *Stimpson*.

1. FLUMINICOLA NUTTALLIANA, *Lea*.

Plate 17, fig. 17.

Shell globosely turbinate, thick, whorls four (apex eroded generally), convex, sutures well impressed; aperture large, widely ovate. Greenish, aperture blue within.

Alt. 10, diam. 8.3 mill.

British Columbia to Sacramento River, California.

2. FLUMINICOLA VIRENS, *Lea*.

Plate 17, fig. 18.

Shell oval, thick, apex eroded, whorls about four and a half or five, moderately convex; aperture narrow-ovate. Bright green, bluish within.

Alt. 10, diam. 6 mill.

Oregon.

3. FLUMINICOLA FUSCA, *Haldeman*.

Plate 17, fig. 19.

Globose, smooth, whorls five, rapidly increasing, sutures very deeply impressed; aperture large, broadly ovate, columella thickened. Color horn to light greenish.

Alt. 10, diam. 8.6 mill.

Oregon, California, Utah, Wyoming and Dakota Territories.

The reddish color mentioned in Haldeman's original description I have not detected in any specimens that have come under my notice, and I suppose that it was due to a deposit of iron. It is very closely allied in general appearance to *Somatogyrus subglobosus*, Say.

Genus TRYONIA, *Stimpson*.

I admit the two following species with some hesitation, because no fresh specimens have ever been found, and it is not at all unlikely that they are both of them entirely extinct.

1. TRYONIA CLATHRATA, *Stimpson*.

Plate 17, fig. 20.

Shell elongated, narrow, apex of spire acute, sutures deeply impressed; whorls eight, with generally about twelve longitudinal ribs crossing them, sometimes crossed by revolving striæ or ridges, and angulated in the middle. Aperture rounded oval, very small.

Alt. 5, diam. 1.5 mill.

Colorado Desert, Southern California. In the dried bed of an ancient lake.

2. TRYONIA PROTEA, *Gould*.

Plate 17, fig. 21.

Shell elongate, slender, whorls seven to eight, moderately convex with well impressed sutures, cancellated by longitudinal and revolving ridges ; aperture small, ovate.

Alt. 7·5, diam. 2·5 mill.

Colorado Desert, Southern California.

Differs from No. 1 by its cancellate surface, destitute of ribs.

Mr. Conrad described this same species under the name of *Melania exigua*, and the date of the publication is given as one month earlier than that of Dr. Gould, but I agree with Mr. Binney, that there is scarcely a doubt but that the latter date is a false one, and Dr. Gould's name was the one really first published.

VIVIPARIDÆ.

SYNONYMY AND REFERENCE TO
P L A T E 1 2 .

Fig.

1, 2. VIVIPARA SUBSOLIDA, Anthony (*Paludina*). Proc. Acad. Nat. Sciences, Philad. 71, 1860.

Tryon, Proc. Acad. Nat. Sci. Philad. 452, 1862.

Melantho decisa, Say. Binney, L. and F. W. Shells, Pt. 3, 50, 1865.

No. 17.

3—7. VIVIPARA GIBBA, Currier (*Melantho*). Am. Jour. Conch. iii, 112, t. 6, f. 3, 1867.

Lewis, Am. Jour. Conch. iv, 82, 1868.

No. 15.

VIVIPARIDÆ.

- . VIVIPARA DECISA, Say (*Paludina*). Hald.
p. 4.
Paludina integra, Say. Hald., p. 10.
Melania ovularis, Menke. Syn. Meth.
134, 1830.
Paludina microstoma, Kirtland. Ohio
Report, 175, 1838.
Paludina heros, De Kay. Moll. N. Y.
85, 1843.
Paludina Milesii, Lea. Proc. Acad. Nat.
Sci. Philad. 156, 1863.
Helix dissimilis, Wood. Index Test. t.
7, f. 18, 1828. No. 16.
11. VIVIPARA NOLANI, Tryon. *This work*
p. 25, 1869. No. 12.
- VIVIPARA RUFA, Haldeman, t. 3, f. 1, p. 3
of wrapper of Part 3, 1841. No. 8.

VIVIPARIDÆ.

SYNONYMY AND REFERENCE TO
P L A T E 1 3 .

Fig.

1. LIOPLAX SUBCARINATA (*Paludina*), Say.
Hald., p. 8.
Paludina sulculosa, Menke. Syn. Meth.
134, 1830.
Paludina bicarinata, Pot. et Mich. Gal.
des Moll. i, 249, t. 25, f. 17, 18.
Helix decisa, Wood. Index Test. Supp.
t. 7, f. 17, 1828. No. 1.
2. VIVIPARA WALTONII, Tryon. Am. Jour.
Conch. ii, 108, t. 10, f. 2, 1866.
Paludina Bengalensis, Hald., t. 7, f. 3, 4.
No. 5.
3. VIVIPARA TEXANA, Tryon. Proc. Ac. Nat.
Sci. 451, 1862.
Reeve, Conch. Icon. f. 24, 1863.
V. subpurpurea, Say, W. G. Binney.
Land and F. W. Shells, Part 3, 21,
1865. No. 7.

4. LIOPLAX ELLIOTTI, Lea. See Plate 15,
No. 4. No. 2.
5. VIVIPARA DECISA, Say. See plate 12, figs.
8, 9.
Paludina Milesii, Lea. (Figured.)
No. 16.
6. VIVIPARA OBESA, Lewis. *This work*, p. 25,
1869.
Melantho decisa, Binney. L. & F. W.
Shells, pt. 3, p. 47, 1865. No. 13.
7. VIVIPARA COARCTATA, Lea. See plate 15,
fig. 1.
Vivipara exilis, Anthony, figured.
No. 21.
- 8, 9, 10. VIVIPARA LIMA (*Paludina*), Anthony.
Proc. Acad. Nat. Sci. Philad. 70,
1860.
Reeve, Conch. Icon. f. 46 b, 1863.
Melantho coarctata, Lea. Binney, L. &
F. W. Shells, Pt. 3, 54, 1865.
No. 20.

VIVIPARIDÆ.

SYNONYMY AND REFERENCE TO
P L A T E 1 4 .

Fig.

- 1, 2. VIVIPARA DECAMPI (*Melantho*), Currier.
Binney, Am. Jour. Conch. i, 49, t.
7, f. 2, 3, 1865.
Binney, L. & F. W. Shells, Pt. 3, 115,
1865. No. 19.
3. VIVIPARA INORNATA, Binney. Am. Jour.
Conch. i, 49, t. 7, f. 1, 1865.
Binney, L. & F. W. Shells, Pt. 3, 114,
1865. No. 2.
4. VIVIPARA PONDEROSA, Say. Hald., p. 13.
Ampullaria crassa, Deshayes. Encyc.
Meth. ii, 32, 1830.

VIVIPARIDÆ.

Paludina decisa (pars), Reeve. Conch.
Icon. f. 45, b, 1863.

Paludina regularis, Lea. Am. Philos.
Proc. ii, 34, 1841. **No. 11.**

VIVIPARA GEORGIANA, Lea. Hald., p. 23,
t. 7, f. 1, 2 (3, 4?).

Paludina Wareana, Shutt. (figured.)
Küster, Monog. 21, t. 4, f. 10, 11.
Reeve, Conch. Icon., *Paludina*, f. 23,
1863. **No. 3.**

VIVIPARA INCRASSATA, Lea. See plate 15,
fig. 7.

Paludina decapitata, Anthony (figured).
No. 18.

LIOPLAX SPILLMANII, Lea (*Paludina*). Proc.
Acad. Nat. Sci. Philad. 81, 1867.
Observations, 103, t. 54, f. 29.
No. 3.

VIVIPARIDÆ.

SYNONYMY AND REFERENCE TO
P L A T E 1 5 .

Fig.

1. VIVIPARA COARCTATA (*Paludina*), Lea. Proc.
Am. Philos. Soc. 11, 243, 1842.
Binney, L. & F. W. Shells, Pt. 3, 52,
1865.
Paludina exilis, Anthony. Proc. Philad.
Acad. 71, 1860. No. 21.
2. LIOPLAX COOSAENSIS (*Paludina*), Lea.
Philos. Proc. 11, 83, 1841.
Reeve, Conch. Icon. f. 22, 1863.
Vivipara Coosaensis, Lea. Binney, L. &
& F. W. Shells, Pt. 3, p. 32, 1865.
No. 4.

3. VIVIPARA TROOSTIANA, Lea (*Paludina*).
 Proc. Am. Philos. Soc. ii, 34, 1841.
 Binney, L. & F. W. Shells, Pt. 3, 31,
 1865. No. 9.
4. LIOPLAX CYCLOSTOMATIFORMIS, Lea. Am.
 Philos. Proc. ii, 83, 1841.
5. VIVIPARA HALEIANA, Lea (*Paludina*). Am.
 Philos. Proc. iv, 167, 1845.
Vivipara Troostiana, Lea (pars). Bin-
 ney, L. & F. W. Shells, Pt. 3, p. 31,
 1865. No. 10.
6. VIVIPARA PONDEROSA, Say. Hald., p. 13.
Paludina regularis, Lea (*figured*). Am.
 Philos. Proc. ii, 34, 1841. No. 11.
7. VIVIPARA INCRASSATA, Lea (*Paludina*).
 Proc. Am. Philos. Soc. 11, 243, 1842.
Paludina decapitata, Anthony. Proc.
 Acad. Nat. Sci. Philad. 71, 1860.
Melantho decisa, (part.) Binney, L. and
 F. W. Shells, Pt. 3, p. 44, 1865.
No. 18.
8. LIOPLAX SPILLMANII, Lea. (See pl. 14, fig.
 7.) No. 3.

SYNONYMY AND REFERENCE TO
P L A T E 1 6 .

AMPULLARIIDÆ.

Fig.

1. AMPULLARIA FLAGELLATA, Say. (Hald., p.
10.) No. 2.

NERITIDÆ.

2. NERITELLA SHOWALTERI, Lea. Proc. Acad.
Nat. Sci. Philad. 55, 1861. Jour.
Acad. Nat. Sci., n. s., v, 267, t. 35,
f. 78, 1863.
Binney, L. & F. W. Shells, Part 3, p.
106, 1865. No. 1.

VALVATIDÆ.

3. VALVATA HUMERALIS, Say. (Hald., p. 9.)
Binney, loc. cit. 14, 1865. No. 3

AMNICOLIDÆ.

- VALVATA VIRENS, Tryon. Proc. Acad. Nat.
Sci. Philad. 148, t. i, f. 11, 1863.
Binney, loc. cit. 14, 1865. No. 4.

AMNICOLIDÆ.

- BYTHINELLA FLORIDANA, Frauenfeld. Proc.
Zool.-bot. Soc. Vienna, t. 10, 1865.
No. 4.
- BYTHINELLA MONROENSIS, Frauenf., Proc.
Zool.-bot. Soc. Vienna, p. 7, 1865.
- BYTHINELLA OBTUSA, Lea. (Hald., p. 24.)
Binney, loc. cit. 70, 1865. No. 6.
- BYTHINELLA INTERMEDIA, Tryon. Am. Jour.
Conch. i, 220, 1865. No. 7.
- BYTHINELLA BINNEYI, Tryon. Proc. Acad.
Nat. Sci. Philad. 148, t. I, f. 10,
1863.
Binney, l. c. 69, 1865. No. 8.
- BYTHINELLA SEEMANI, Frauenfeld. Proc.
Zool.-bot. Soc. Vienna, t. 8, 1865.
No. 9.

AMNICOLIDÆ.

SYNONYMY AND REFERENCE TO
PLATE 17.

Fig.

1. AMNICOLA LIMOSA, Say. (Hald., p. 10.)
Amnicola Schrockingeri, Frauenfeld (*figured*). Proc. Zool.-bot. Gesell. Vienna. No. 2.
2. AMNICOLA LIMOSA, Say. (Hald., p. 10.)
Amn. parva, Lea. (Hald., p. 24.) No. 2.
3. AMNICOLA LIMOSA, Say. (Hald., p. 10.)
Amn. orbiculata, Lea. (Hald., p. 24.) No. 2.
4. AMNICOLA GRANUM, Say. (Hald., p. 17.)
Binney, l. c. 86, 1865. No. 7.
5. AMNICOLA LONGINQUA, Gould. Proc. Bost. Soc. Nat. Hist. v, 130, 1855.
Binney, l. c. 88, 1865. No. 8.

AMNICOLIDÆ.

- AMNICOLA TURBINIFORMIS, Tryon. Am. Jour.
 Conch. i, 219, t. 22, f. 5, 1865. No. 9.
- POMATIOPSIS LUSTRICA, Say. (Hald., p. 16.)
 Binney, l. c. 94, 1865. No. 2.
- COCHLIOPA ROWELLII, Tryon. Proc. Acad.
 Nat. Sci. Philad. 147, t. 1, f. 8, 9,
 1863.
 Binney, l. c. 73, 1865. No. 1.
- SOMATOGYRUS ALTILIS, Lea (*Melania*). Proc.
 Am. Philos. Soc. 11, p. 13, 1841.
Gillia altilis, Binney, l. c. 74, 1865.
Leptoxis crenata, Haldeman. Chenu
 Illust. t. 5, f. 153.
Gillia crenata, Binney, l. c. 75, 1865.
 No. 1.
11. SOMATOGYRUS SUBGLOBOSUS, Say (*Palu-
 dina*). Jour. Acad. Philad. v, 125,
 1825.
 Hald. Monog. t. 10, f. 7, 8.
Melania isogona, Say. New Harmony
 Dissem. ii, 227, 1829.
Somatogyrus isogonus, Say. Binney, l.
 c. 77, 1865.

Paludina pallida, Lea. Trans. Am.
Philos. Soc. vi, 22, t. 23, f. 104, 1839.

No. 2.

12. SOMATOGYRUS DEPRESSUS, Tryon (*Amnicola*). Proc. Acad. Nat. Sci. Philad. 452, 1862.

Binney, l. c. 77, 1865.

No. 3.

13. SOMATOGYRUS CURRIERIANUS, Lea. Proc. Philad. Acad. 156, 1863. Observations, xi, 142, t. 24, f. 118. No. 4.

14. SOMATOGYRUS AUREUS, Tryon. Am. Jour. Conch. 1, 220, t. 22, f. 9, 1865.

No. 5.

15. SOMATOGYRUS PARVULUS, Tryon. Am. Jour. Conch. 1, 221, t. 22, f. 10, 1865.

No. 6.

16. SOMATOGYRUS INTEGER, Say (*Melania*). New Harm. Dissem. 11, 276, 1840.

Binney l. c. 79, 1865.

Leptoxis integra, Hald. Monog. Chenu
Illust. t. 5, f. 154.

Paludina fontinalis, Philippi, Neuer
Conchyl. ii, 5, p. 2, t. 2, f. 9, 1846.

No. 7.

AMNICOLIDÆ.

- . FLUMINICOLA NUTTALLIANA, Lea (*Paludina*). Trans. Amer. Philos. Soc. vi, 101, t. 23, f. 109, 1839.
Paludina seminalis, Hinds. Voyage Sulphur, 59, t. 16, f. 22, 1844.
Amnicola Hindsi, Baird. Proc. Zool. Soc. 67, 1863. No. 1.

- . FLUMINICOLA VIRENS, Lea (*Paludina*). Am. Philos. Soc. vi, 91, t. 23, f. 93, 1839.
 Binney, l. c. 91, 1865.
Paludina nuclea, Lea, l. c. vi, 91, t. 23, f. 103, 1839. No. 2.

- . FLUMINICOLA FUSCA, Haldeman (*Leptoxis*). Monog. t. 3, 4, f. 83, 84.
 Binney, l. c. 92, 1865. No. 3.

- . TRYONIA CLATHRATA, Stimpson. Am. Jour. Conch. i, 54, t. 8, f. 1, 1865.
 Binney, l. c. 91, 1865. No. 1.

- . TRYONIA PROTEA, Gould (*Amnicola*). Proc. Bost. Soc. N. Hist. v, 129, 1855.
 Binney, l. c. 71, 1865.
Melania exigua, Conrad. Proc. A. N. S. Philad. vii, 269, 1855. No. 2.

Family *PHYSADÆ*, Haldeman.

Monog. Physa, p. 5, 1842.

GENERA.

1. Shell oblong, spiral, aperture oval, entire below.

Subfamily *LIMNÆINÆ*.

Dextral, spire more or less elongated,

LIMNÆA, Lamarck.

Sinistral, oblong. Margin of the mantle fringed; . . . *PHYSA*, Draparnaud.

Sinistral, oval-elongated. Mantle-margin simple, . . . *BULINUS*, Adanson.

2. Shell turbinate, spiral, not umbilicated, whorls gibbosely rounded.

Subfamily *POMPHOLIGINÆ*, *Dall*.

POMPHOLYX, Lea.

3. Shell turbinate, spiral, umbilicate, whorls angulated and carinated.

Subfamily MEGASISTROPHINÆ, *Tryon*.

MEGASYSTROPHA, *Lea*.*

4. Shell dextral, discoidal, whorls visible above and below.

Subfamily PLANORBINÆ.

Aperture unarmed, PLANORBIS, *Guettard*.

Aperture toothed within,

SEGMENTINA, *Fleming*.

5. Shell non-spiral, conical, patelliform.

Subfamily ANCYLINÆ.

- * Base or aperture oval, entirely open.

Apex directed to the right,

ANCYLUS, *Geoffroy*.

Apex directed to the left,

ACROLOXUS, *Beck*.

- * Base partly closed by a horizontal lamina.

Apex directed backwards,

GUNDLACHIA, *Pfeiffer*.

* Mr. Binney's name *Carinifex* is generally quoted for this genus, but Mr. Lea's name has priority. It is true that Mr. Binney used the name at an earlier date in some proof sheets, but he requests in the preface that they shall "not be quoted as authority, or referred to as a published work." I yield to Mr. Binney's request.

LIMNÆINÆ.

Genus LIMNÆA, *Lamarck.*

For description of the animal, see Haldeman's Monograph. Lamarck's first species in the "Animaux sans Vert." is the *Columna flamma*, a terrestrial mollusk; we cannot therefore take it as the type of the genus. The second species is *stagnalis*, but that is the type of Klein's genus *Auricula*. If we adopt the latter name in preference to Lamarck's, having priority, the name of the terrestrial genus *Auricula*, Lam., will have to be changed. Under these circumstances it seems most desirable to restrict the Lamarckian generic name to certain species only of the genus, and to separate as subgeneric *L. stagnalis*, etc., applying to them Klein's name *Auricula*, thus preserving both names.

The following are the subgeneric divisions and the species belonging to each, those characterized in Haldeman being printed in

Roman, while others, including the more recently described species, are in Italics :

1. Shell sub-ovate, last whorl ventricose ; aperture more than half the length of the shell, greatly expanded,

Genus LIMNÆA, Lam.

L. ampla, Mighels, *L. decollata*, Mighels (= *catascopium*, *pars.* Hald.), *L. columella*, Say, *L. macrostoma*, Say, *L. casta*, Lea.

2. Shell spiral, oblong, translucent, horn-colored ; spire acute, more or less produced, last whorl ventricose ; aperture large, wide, rounded in front ; inner lip with an oblique fold ; outer lip simple,

Subgenus AURICULA, Klein.

L. stagnalis, Linn. (= *jugularis* and *appressa*, Say), *L. lepida*, Gould.

3. Shell thick in texture, ovate, inflated ; spire short, outer lip not expanded,

Subgenus BULIMNEA, Hald.

L. megasoma, Say.

4. Shell ovate-oblong ; spire conic ; about as

long as the aperture, whorls rounded; outer lip not spreading.

Subgenus LIMNOPHYSA, Fitzinger.

L. reflexa, Say (*L. umbrosa*, Say), *L. attenuata*, Say, *L. Shurtleffii*, Tryon, *L. Haydeni*, Lea, *L. palustris*, Müll., (*L. fragilis*, Hald.), *L. proxima*, Lea, *L. Rowellii*, Tryon, *L. Traskii*, Lea, *L. desidiosa*, Say, *L. emarginata*, Say, *L. catascopium*, Say, *L. caperata*, Say, *L. brownii*, Tryon, *L. Gabbii*, Tryon, *L. Adelineæ*, Tryon, *L. Vahlæ*, Beck, *L. Holbollæ*, Beck, *L. nitrea*, Hald., *L. pallida*, Adams, *L. bulimoides*, Lea, *L. arctica*, Lea, *L. Smithsoniana*, Lea, *L. plida*, Lea, *L. humilis*, Say, *L. ferruginea*, Hald., *L. techella*, Hald.

. Shell nearly cylindrical; spire thick, lengthened; aperture small,

Subgenus LEPTOLIMNEA, Swainson.

L. Kirtlandiana, Lea, *L. lanceata*, Gould.

. Shell very slender, spire attenuated, whorls flattened, oblique; aperture produced, expanded, without fold,

Subgenus ACELLA, Hald.

L. gracilis, Jay.

*Typical Species.*1. LIMNÆA COLUMELLA, *Say.*

Hald., p. 38, t. 12, figs. 8—15.

Plate 16, fig. 1.

To this species is to be added Dr. Lea's recently described *Succinea pellucida* (which I figure), and the following I exclude from it:

2. LIMNÆA MACROSTOMA, *Say.*

Hald., p. 38, t. 12, figs. 1—7.

Plate 16, fig. 2.

The differences mentioned by Haldeman appear to me to be permanent. Not only are they apparently constant in specimens collected in the vicinity of Philadelphia, but there are even greater differences in the southern specimens. I figure *L. macrostoma* from Charleston, S. C.

3. LIMNÆA CASTA, *Lea.*

Plate 16, figs. 3, 4, 5.

Shell subfusiform, narrow, whorls very oblique, flattened, thin, imperforate; whorls five, spire narrow, pointed; aperture narrow-ovate, effuse below. Light horn color.

Length 15, diam. 8 mill.

Rhode Island, Ohio, Georgia.

This shell is much narrower and more oblique than *columella*. Fig. 3 represents a specimen from Georgia, which I consider typical in its form; fig. 4 is an outline of the type of Dr. Lea's *L. strigosa*, and fig. 5 represents *L. coarctata*, Lea, the latter founded on a monstrosity of frequent occurrence in all the species of *Limnæa*,—namely, an angulated instead of a rounded periphery.

4. LIMNÆA DECOLLATA, *Mighels*.

Hald., p. 52, t. 14, figs. 1—3.

Shell very ventricose, rather thick, sub-ovate or subrotund, in outline an irregular rhomboid; epidermis of an olivaceous green color, rather thin, deciduous; whorls two to three; spire very short, generally decollated; whole surface generally rather rough; striæ of growth coarse and fine alternately; transverse striæ on the body whorl sparse, interrupted, sometimes obsolete; body whorl composes almost the whole shell; aperture very large, subcampanulate; its length is very little greater than the breadth, and occupies more than two-thirds the length of the shell; labrum rather thin, simple; fold of the columella very prominent.

Length 15, diam. 10·5 mill.

Unity, Maine; Connecticut.

This species, confounded by Haldeman with *L. catascopium*, is now very generally acknowledged to be distinct, and, in fact, to belong to a different group of species.

5. LIMNÆA AMPLA, *Mighels*.

Plate 16, figs. 6, 7, 8.

Plate 16, fig. 9, *L. Binneyi*, Tryon.

Plate 16, fig. 10, *L. Sumassi*, Baird ? teste Binney.

Hald., t. 14, figs. 4, 5.

Shell large, much inflated, suboval, rather thin, composed of five convex whorls, prominently shouldered at the upper part; epidermis of an obscure olivaceous green color; lines of accretion very fine and compact; transverse lines obscure; suture deep, and in one specimen canaliculate; spire short, and pointed when present; aperture oblong, very wide at the posterior part, but narrowing rapidly anteriorly and occupying rather more than two-thirds the length of the shell; labrum thin and somewhat reflected; labium broadly reflected, forming and partially covering an open and very deep umbilicus; columella fold very prominent.

Length 33, diam. 25 mill.

Northern Maine; St. Lawrence River, English River, British America; Hellgate River and Fort Vancouver, Oregon.

This remarkable species, the American analogue of *L. auricularia*, will doubtless be found an inhabitant of the vicinity of the boundary line between the United States and British North America throughout its entire extent.

I merge it in my *L. Binneyi*, and also the two Oregon specimens figured by Haldeman, Plate 14, figs. 4, 5. Without doubt the specimen figured by Binney (f. 10) as *Sumassi*, Baird?, belongs also to this species.

Subgenus A U R I C U L A , *Klein*.

6. LIMNÆA STAGNALIS, *Linn*.

Hald., 16, t. 4, *L. jugularis*, Say.

Hald., 18, t. 5, *L. appressa*, Say,

Plate 16, fig. 11.

This very fine species inhabits our whole north-western frontier States from Ohio to

Oregon. It also inhabits Siberia and every part of Europe. I figure a specimen from Iowa, which much exceeds the dimensions of Haldeman's figures.

7. LIMNÆA LEPIDA, *Gould.*

Plate 16, figs. 12, 13.

Shell very fragile, elongated, very acutely conical, subumbilicate, pale horn-color; whorls five, oblique, moderately convex, forming an acuminate spire; suture moderately impressed; surface smooth and shining, lines of growth faint. Aperture large and expanded, nearly semicircular, half the length of the shell; outer lip expanded; columella having a very strongly marked sharp fold, and broadly covered with a thin callus, which, not being closely appressed at the umbilical region, leaves a small chink.

Length 15, diam. 6 mill.

Lake Vancouver, Oregon.

I have not seen this species, which in

general form appears to approach my *L. Gabbii*. The latter, however, is rather more robust, and has no umbilical opening.

Subgenus BULIMNEA, *Haldeman*.

8. LIMNÆA MEGASOMA, *Say*.

Hald., p. 13, t. 3, figs. 1, 3.

Inhabits from Lake Champlain westward in the great lakes to Michigan.

Subgenus LIMNOPHYSA, *Fitzinger*.

**Shell large, narrow, with elevated spire.*

9. LIMNÆA REFLEXA, *Say*.

Hald., Monog., 26, t. 8.

L. umbrosa, Say, Hald. Monog. 24, t. 7, figs. 1, 2, 3, 6, 7, 8.

L. zebra, Tryon, Plate 16, fig. 14.

I have concluded, after careful study of a large series of specimens, that my *L. zebra*

cannot be specifically separated from *reflexa* ; it might, however, retain its name as a beautiful variety. The species appears to extend through all the north-western States, but does not inhabit the waters flowing into the Pacific Ocean, being there replaced by an allied, but distinct species, *L. Rowellii*.

10. LIMNÆA ATTENUATA, *Say*.

Hald. Monog. 28, t. 9, figs. 1, 5.

11. LIMNÆA ROWELLII, *Tryon*.

Plate 17, fig. 1.

Shell elongate, narrow, consisting of six rather obliquely revolving whorls ; spire somewhat attenuately lengthened ; apex acute ; suture not much impressed ; aperture not half the length of the shell, oblique ; columella with a distinct fold, turned to the left below, and appressed to the body the whole distance ; surface rather smooth and polished ; texture fragile.

Length 25, diam. 10 mill.

Hab.—California and Oregon.

This shell resembles *L. attenuata* and *L. reflexa* more than any others. The first is much narrower, and the whorls are not so convex, while the latter is more elongated, more convex, and the aperture is narrower and turned back.

12. LIMNÆA PROXIMA, *Lea*.

Plate 17, fig. 2.

L. Traskii, Tryon. Plate 17, fig. 3.

Shell acutely conic, rather thin, closely and irregularly striated, horn-colored, minutely perforated; spire subelevated, sharpened at the apex; sutures deeply impressed; whorls seven, convex, rapidly enlarging; aperture subinflated, subelliptical, banded within, columella slightly plicate.

Length 23, diam. 11 mill.

California.

L. Traskii was described from a solitary

specimen. Its principal distinctive feature is the very convex body whorl, which is almost shouldered, and it is also umbilicate; but I am inclined to believe these the result of accidental distortion rather than specific differences, and in all other respects it corresponds with *proxima*.

13. LIMNÆA PALUSTRIS, Müller.

Plate 17, fig. 4.

L. fragilis (not of Linn.), Hald. Monog., 20, 53, t. 6, and t. 15, fig. 1.

L. umbrosus, Hald., t. 7, figs. 4, 5.

L. expansa, Hald. Monog., 29, t. 9, figs. 6, 8.

L. Sumassii, Baird. Plate 17, fig. 5.

This species extends across the continent through the great lakes and their tributaries from Lake Champlain. It is very numerous in nearly all the streams of the West Coast, and extends southwards to New Mexico. It is a common European species. I figure (fig. 4) an angular monstrosity of this species from Mountain Lake, Cal.

14. LIMNÆA HAYDENI, *Lea.*

Plate 17, fig. 6.

Shell ovate-conic, smooth, thin, light horn-colored, imperforate; spire rather short; whorls five, convex; sutures deeply impressed; aperture ovate; columella strongly plicate.

Length 25, diam. 12 mill.

Yellowstone and Big Sioux Rivers.

The whorls are more rounded and the shell more cylindrical than *L. palustris*.

14. A. LIMNÆA SHURTLEFFII, *Tryon.*

Plate 17, figs. 7, 8.

Ovate-cylindrical, rather thin, diaphanous, minutely concentrically striate; spire moderately elevated, apex acute, suture impressed; whorls six, flatly convex, the last one three-fourths the length of the shell, subcylindrical, compressed on the sides; aperture one-half

the total length, contracted, somewhat ear-shaped, columella with a considerable twist, reflected over and nearly covering the umbilicus. Light brown or horn color, shining, tip of spire and interior margin of labrum colored dark bluish-purple.

Length 19, diam. 9 mill.

Weatogue, Hartford Co., Connecticut.

This very curious species was found in an artificial pond in 1865, and has not occurred elsewhere. A pint of specimens were obtained, remarkably uniform in character. The pond has no connection with any other body of water, the overflow being lost in a sandy plain. In the same locality occurred a new species of *Planorbis*. Full particulars relating to this interesting locality accompany the original description in *American Journal of Conchology*, vol. 2, p. 112. Here are instances of species of *very* recent origin.

** *Shell small, narrow, with elevated spire.*

† *British and Danish American Species.*

15. LIMNÆA ARCTICA, *Lea.*

Plate 17, fig. 9.

Shell elliptical, somewhat inflated, rather thick, not umbilicate, minutely striate, pale horn-color; spire obtuse, decorticated; sutures impressed; whorls convex; aperture broadly elliptical, rather large; outer lip regularly expanded; columella thickened in the middle and furnished with a large fold.

Length 10, diam. 6 mill.

Moose River of Hudson's Bay, Arctic America.

16. LIMNÆA VAHLII, *Beck.*

Plate 17, fig. 10.

Shell ovate, convex, spire moderate, apex obtuse, decorticated; whorls six, with well-marked sutures; aperture large, ear-shaped,

with a strong columellar nearly or quite covering the umbilicus. Light horn-color, thin.

Length 19, diam. 9 mill.

Greenland.

The volutions are a little more oblique and the shell is smaller, but otherwise it does not essentially differ from *L. palustris*.

17. LIMNÆA HOLBOLLII, *Møeller*.

Plate 17, fig. 11.

Shell thin, conic-ovate, spire elongated, whorls five, well rounded, with deeply impressed sutures; aperture small, rounded ovate, columella slightly folded; umbilicate.

Length 12, diam. 6 mill.

Greenland.

This shell is at once distinguished from the preceding species by its smaller size, rounded whorls and aperture, and open umbilicus. It is allied to *L. humilis*, Say, but the spire is more elevated and the whorls not so convex; it is also a more solid species.

†† *Species of the far Western and Pacific Coast States.*

18. LIMNÆA TRASKII, *Lea.*

Plate 18, fig. 1.

Shell subfusiform, thin, light brown, semi-transparent, slightly umbilicate, very minutely striate, shining; spire conoidal; sutures impressed; whorls five, somewhat convex; aperture rather small, ovate, brown within the margin; outer lip somewhat expanded; columella thickened and plicate.

Length 14, diam. 6·5 mill.

San Antonio Arroya, California.

I restore Dr. Lea's first name for this species. He subsequently changed it to *Tryonii* because I had preoccupied the name *Traskii*; but since my species proves to be a synonym, Dr. Lea's first name becomes free.

19. LIMNÆA SMITHSONIANA, *Lea.*

Plate 18, fig. 2.

Shell fusiform, rather thin, reddish-brown, slightly transparent, slightly umbilicate, very minutely and transversely striate; spire obtuse; sutures impressed; whorls six, convex; aperture rather large, ovate, brown within the margin; outer lip expanded; columella somewhat thickened and scarcely plicate.

Length 12, diam. 8 mill.

Loup Fork of the Platte River.

Very like *L. humilis*, Say, but much larger.

20. LIMNÆA FERRUGINEA, *Haldeman.*

Hald. Monog. 49, t. 13, figs. 19, 20.

††† *Species of the Atlantic Basin of the
United States.*

21. LIMNÆA DESIDIOSA, *Say*.

Hald. Monog. 31 and 48, t. 10, t. 13, figs. 16—18.

L. modicella, *Say*. Hald., t. 13, figs. 3, 6—8. (*Sub nom.*
L. humilis, *Say*.)

Limnæa Jamesii, *Lea*. Plate 18, fig. 3.

Very common in the middle Atlantic States, and becoming more rare westwards to the Mississippi River.

The large, expanded specimens of Haldeman's plate 10 belong probably to *L. macrostoma*, *Say*, as *desidiosa* is a narrow, small species, and I have never obtained any specimens resembling Haldeman's figures 7, 8, 9.

Mr. Lea's species was collected at Cincinnati, Ohio.

22. LIMNÆA HUMILIS, Say.

Hald., Monog., 41, t. 13, figs. 1, 2, 4, 5.

L. Lecontii, Lea. Plate 18, fig. 4.

L. Griffithiana, Lea. Plate 18, fig. 5.

This species is abundantly distributed from Vermont to South Carolina and Georgia, and westward to California. The illustrations of Haldeman are rather unfortunate, representing extreme rather than the typical forms. For the latter, my figure of *L. Griffithiana* will answer very well.

Limnæa modicella, Say, included by Haldeman and Binney in the synonymy of this species, is synonymous with *L. desidiosa*, as I have convinced myself by a critical study of type specimens preserved in the Philadelphia Academy.

23. LIMNÆA CAPERATA, *Say*.

Hald. Monog. 34, t. 11, figs. 1—9.

Is common throughout the northern and western States, and I have it also from several Californian localities.

24. LIMNÆA VITREA, *Haldeman*.•

Hald. Monog. 47, t. 13, figs. 14, 15.

25. LIMNÆA PALLIDA, *Adams*.

Hald. Monog. 47, t. 13, figs. 11—13.

I doubt the correctness of determination of the specimens quoted from California in Binney's "Land and Freshwater Shells."

*** *Shell small or moderate, globosely ovate.*

26. LIMNÆA CATASCOPIUM, Say.

Hald. Monog. 6, t. 1.

This species is most numerous in the waters of the Middle Atlantic States, and scarcely extends southwards. To the north it reaches, however, to the British possessions, and westward to Michigan, while the specimens reported from far western localities probably belong to other species; those represented by Binney's figure 86 are *L. solida*, Lea. On the west coast this species is replaced by its ally *L. Adelinæ*, Tryon.

The short variety (*L. pinguis* of Say) is numerous in the vicinity of Philadelphia; there is also a variety both at Mohawk, New York, and at Philadelphia, which by its long spire reminds one of *L. elodes*, Say (= *palustris*, Müller).

27. LIMNÆA ADELINÆ, *Tryon.*

Plate 18, fig. 6.

Shell thin, semi-transparent, body whorl large, wide, convex; spire small, consisting of five convex volutions, attenuating rapidly to an acute apex, sutures impressed; inner lip thin, reflected, but not covering the umbilical fissure, which is narrow; columella twisted; color light horn, polished within the aperture, outer lip tinged with red within.

Length 14, diam. 8·5 mill.

San Francisco, and other localities in California.

This shell is nearly allied to *L. catascopium*, Say, but it may be distinguished by being more fragile, more transverse, with a smaller, more rapidly attenuating spire, but principally by the presence of an umbilical fissure, which in *catascopium* is entirely concealed by the appression of the labium.

28. LIMNÆA GABBII, *Tryon.*

Plate 18, fig. 7.

Shell somewhat oval, with rather short, attenuated spire, acute at apex; whorls not much rounded; suture well impressed; body whorl proportionally large, but not inflated; aperture moderate, semi-oval, a little oblique; columella oblique, narrow, scarcely folded, appressed, covering the umbilicus; surface covered with very close, fine striæ.

Length 13, diam. 7 mill.

Clear Lake, California.

This shell very closely resembles *L. catascopium*, Say, but differs in several particulars; the spire is narrower and more attenuate, the body whorl is not so much inflated, the lines of growth are much closer and finer, the columella is different, and the aperture is narrow below instead of being somewhat broadly rounded, as in *catascopium*. All the specimens received were of the same size as the one figured.

29. LIMNÆA BROWNII, *Tryon*.

Plate 18, fig. 8.

Shell very like a miniature *L. catascopium*, Say, being about half the size of that species; whorls $4\frac{1}{2}$, rapidly increasing, well rounded; suture well impressed; spire moderate, apex acute; aperture widely ear-shaped, columella thickened, flattened, appressed to the body whorl, and covering entirely the umbilicus, strongly folded and indented above; texture of shell quite solid; light horn color.

Length 9, diam. 6 mill.

Elyria, Ohio.

There is no American species with which this is likely to be confounded, being unusually solid for the genus and for its size.

30. LIMNÆA EMARGINATA, *Say*.

Hald. Monog., 10, t. 2.

Haldeman's figures 6—8, for which he proposes the name *serrata* should they prove to

be new, merely represent forms occurring in all the western species. It has been suggested that this species may not be distinct from *catascopium*, but there is, I think, no doubt of its distinctness; the shell is larger, more inflated, lighter colored, emarginate, and is decidedly a north-western species, while *catascopium* certainly originated in the Atlantic Middle States, although extending westward to Michigan.

31. LIMNÆA BULIMOIDES, *Lea*.

Hald. Monog. 44, t. 13, figs. 9, 10.

Inhabits Oregon and California, and perhaps Nebraska.

32. LIMNÆA SOLIDA, *Lea*.

Hald. Monog. 36, t. 11, figs. 10—13.

Mr. Binney's figure 86 represents this species.

33. LIMNÆA TECHELLA, *Hald.*

Plate 18, fig. 9.

Shell short, inflated, perforate, diaphanous, light greenish horn-color, smooth and shining; whorls five, convex; aperture large, subangulate behind.

Length 6, diam. 4 mill.

Texas.

Surface smoother than in *L. bulimoides*, Lea, of Oregon, with the lines of accretion less apparent, and the labium more angular. In some individuals the shell is thick enough to be corroded.

Subgenus LEPTOLIMNEA, *Swainson.*

34. LIMNÆA KIRTLANDIANA, *Lea.*

Plate 18, fig. 10.

Shell turrated, thin, irregularly striate, pale horn-color, imperforate; spire attenuate; su-

tures impressed; whorls six, slightly convex; aperture narrow-elliptical.

Length 17·5, diam. 6·3 mill.

Poland, Ohio; Nebraska.

35. LIMNÆA LANCEATA, *Gould.*

Plate 18, fig. 11.

Shell moderate, thin, diaphanous, horn-colored, delicately reticulated with incremental and revolving striæ; whorls six, flattened, quite oblique, the last equaling three-fourths of the shell's length; aperture narrow, almost equaling one-half the shell's length, acute posteriorly; columella fold conspicuous, acute, scarcely spiral; labrum with a submarginal chestnut band.

Length 20, diam. 6 mill.

Lake Superior.

Next to *L. gracilis* this is the most delicate species we have. It may be compared with *L. attenuata* and *L. reflexa*, from both of which it differs in the flatness of its whorls, in its

aperture, which is proportionally much longer and narrower, and in being only about half their size.

Subgenus A C E L L A , *Hald.*

36. LIMNÆA HALDEMANI, *Deshayes.*

Limnæa gracilis, Jay. Hald. Monog. 50, t. 13, fig. 21.

Inhabits from Lake Champlain to Michigan.

Spurious Species.

LIMNÆA RUGOSA, Val. Hald. Monog. 15, t. 3,
f. 4, 5.

This is a *Bulimus*, probably from Mexico or South America. The localities in Valenciennes' work are frequently very erroneous, and but little dependence can be placed upon them.

LIMNÆA PLATYSTOMA, Hald. Suppl. to Monog.
pt. 1, p. 2.

The types are in the collection of the Academy, and the ticket bears in the author's handwriting, "Maine or Marseilles." The latter locality is probably correct; at any rate the species is the common European *L. ovata*.

PHYSELLA BERENDTI, Pfeiffer.

I cannot understand why Mr. Binney has admitted this into his work on Freshwater Shells (p. 73, f. 118), as the species is terrestrial and allied to *Glandina*.

LIMNÆINÆ.

SYNONYMY AND REFERENCE TO
P L A T E 1 6 .

Fig.

- LIMNÆA COLUMELLA, Say. Hald., p. 38, t.
12, f. 8—15.
Binney, L. and F. W. Shells, pt. 2, 32,
1865.
1. *Succinea pellucida*, Lea (figured), Proc.
Acad. Philad. 10, 1864. No. 1.
2. LIMNÆA MACROSTOMA, Say.
L. columella, Say (pars.) Hald. 38, t.
12, f. 1—7. Binney, l. c. 33. No. 2.
3. LIMNÆA CASTA, Lea. Am. Philos. Proc. ii,
33, 1841.
L. columella, Say (pars.) Hald. 38.
Binney, l. c. 33.

4. *L. strigosa*, Lea. Am. Philos. Proc. ii,
33, 1841.
5. *L. coarctata*, Lea. Am. Philos. Proc.
ii, 33, 1841. No. 3.
- LIMNÆA DECOLLATA, Mighels. Hald. 52,
t. 14, f. 1—3.
Binney, l. c. 32. No. 4.
- 6—8. LIMNÆA AMPLA, Mighels. Bost. Proc.
i, 129, 1843.
L. decollata, Mighels. Binney, l. c. 30.
Hald., t. 14, f. 4, 5?
9. *L. Binneyi*, Tryon. Am. Jour. Conch.
i, 229, t. 23, f. 3, 1865.
10. *L. Sumassi*, Binney (not Baird), l. c.
43, f. 58. No. 5.
11. LIMNÆA STAGNALIS, Linn.
Binney, l. c. 25.
L. jugularis, Say. Hald. 16, t. 4.
L. appressa, Say. Hald. 16, t. 5.
No. 6.
- 12, 13. LIMNÆA LEPIDA, Gould. Proc. Bost.
Soc. Nat. Hist. ii, 211, 1847.
Binney, l. c. 29. No. 7.

LIMNÆA MEGASOMA, Say. Hald. Monog.

13, t. 3, f. 1—3.

Binney, 1, c. 37.

No. 8.

LIMNÆA REFLEXA, Say. Hald. 26, t. 8.

Binney, 1. c. 38.

L. umbrosa, Say. Hald. 24, t. 7, f. 1,

2, 3, 6, 7, 8.

14. *L. zebra*, Tryon (figured). Am. Jour.

Conch. i, 228, t. 23, f. 4, 1865.

No. 9.

LIMNÆINÆ.

SYNONYMY AND REFERENCE TO
P L A T E 1 7 .

Fig.

- LIMNÆA ATTENUATA, Say. Hald. 28, t. 9,
f. 1, 5.
L. subulatus, Küster. Conchyl. Cab.
24, t. 4, f. 24.
Binney, l. c. 42. No. 10.
1. LIMNÆA ROWELLII, Tryon. Am. Jour.
Conch. i, 228, t. 23, f. 1, 1865.
No. 11.
2. LIMNÆA PROXIMA, Lea. Proc. Acad. Nat.
Sci. Philad. 80, 1856.
Binney, l. c. 48.
3. *L. Traskii*, Tryon. Proc. Acad. Nat.
Sci. Philad. 149, t. i, f. 13, 1863.
Binney, l. c. 60. No. 12.
4. LIMNÆA PALUSTRIS, Müller.
Binney, l. c. 44.

- L. fragilis* (not Linn.), Hald., 20, 53,
t. 6, and t. 15, f. 1.
- L. umbrosus*, Say. Hald., t. 7, f. 4, 5.
- L. expansa*, Hald., 29, t. 9, f. 6, 8.
5. *L. Sumassi*, Baird. Proc. Zool. Soc.
London, 68, 1863.
Binney, l. c. 43. No. 13.
6. LIMNÆA HAYDENI, Lea. Proc. Acad. Nat.
Sci. Philad. 166, 1858. No. 14.
- 7, 8. LIMNÆA SHURTLEFFII, Tryon. Am. Jour.
Conch. ii, 3, t. 10, f. 4, 5, 1866.
No. 14 A.
9. LIMNÆA ARCTICA, Lea. Proc. Philad. Acad.
113, 1864. No. 15.
10. LIMNÆA VAHLII, Beck. Möller, Ind. Moll.
Groen. 4, 1842.
Binney, l. c. 57.
L. Pingelii, Beck. Moll. Index, 2.
Binney, p. 58.
L. Wormskioldii, Beck. Mörch, Moll.
Groen. 76. No. 16.
11. LIMNÆA HOLBOLLII, Möller. Ind. Moll.
Groen. 5, 1842.
Binney, l. c. 59. No. 17.

LIMNÆINÆ.

SYNONYMY AND REFERENCE TO
P L A T E 1 8 .

Fig.

1. LIMNÆA TRASKII, Lea. Proc. Philad. Acad.
113, 1864.
L. Tryonii, Lea. Observ. xi, 118, t.
24, f. 78. No. 18.
2. LIMNÆA SMITHSONIANA, Lea. Proc. Philad.
Acad. 113, 1864. No. 19.
- LIMNÆA FERRUGINEA, Hald. 49, t. 13, f.
19, 20.
Binney, l. c. 67. No. 20.
- LIMNÆA DESIDIOSA, Say. Hald. Monog. 31,
48, t. 10, t. 13, f. 16—18.
Binney, l. c. 48.
L. modicella, Say. Hald. t. 13, f. 3, 6
—8 (sub-nom. *L. humilis*).

3. *L. Jamesii*, Lea (figured). Proc. Philad. Acad. 113, 1864.
L. plica, Lea. Philos. Proc. ii, 33, 1841.
L. planulata, Lea. Ibid.
L. rustica, Lea. Ibid. **No. 21.**
- LIMNÆA HUMILIS, Say. Hald. Monog. 41, t. 13, f. 1, 2, 4, 5.
 Binney, l. c. 63.
4. *L. Lecontii*, Lea. Proc. Philad. Acad. 113, 1864.
5. *L. Griffithiana*, Lea. Proc. Am. Philos. Soc. ii, 33, 1841.
L. curta, Lea. Philos. Proc. ii, 33, 1841.
L. parva, Lea. Ibid.
L. exigua, Lea. Ibid. **No. 22.**
- LIMNÆA CAPERATA, Say. Hald. Monog. 34, t. 11, f. 1—9.
 Binney, l. c. 56. **No. 23.**
- LIMNÆA VITREA, Hald. Monog. 47, t. 13, f. 14, 15.
 Binney, l. c. 60. **No. 24.**
- LIMNÆA PALLIDA, Adams. Hald. Monog. 45, t. 13, f. 11—13.
 Binney, l. c. 60. **No. 25.**

- LIMNÆA CATASCOPIUM, Say. Hald. Monog.
6, t. 1.
Binney, l. c. 53. No. 26.
6. LIMNÆA ADELINÆ, Tryon. Proc. Philad.
Acad. 149, t. 1, f. 12, 1863. No. 27.
7. LIMNÆA GABBII, Tryon. Am. Jour. Conch.
i, 229, t. 23, f. 2, 1865. No. 28.
8. LIMNÆA BROWNII, Tryon. Am. Jour.
Conch. i, 229, t. 23, f. 15, 1865.
No. 29.
- LIMNÆA EMARGINATA, Say. Hald. Monog.
10, t. 2.
L. serrata, Haldeman.
Binney, l. c. 51. No. 30.
- LIMNÆA BULIMOIDES, Lea. Hald. Monog.
44, t. 13, f. 9, 10.
Binney, l. c. 61. No. 31.
- LIMNÆA SOLIDA, Lea. Hald. Monog. 36, t.
11, f. 10—13.
Binney, l. c. 62. No. 32.

9. LIMNÆA TECHELLA, Hald. Am. Jour.
Conch. iii, 194, t. 6, f. 4, 1867.

No. 33.

10. LIMNÆA KIRTLANDIANA, Lea. Am. Philos.
Proc. ii, 33, 1841.

Binney, l. c. 67.

No. 34.

11. LIMNÆA LANCEATA, Gould. Proc. Bost.
Soc. iii, 64, 1848.

Binney, l. c. 68.

No. 35.

- LIMNÆA HALDEMANI, Deshayes. Binney,
Jour. de Conch. vii, No. 4, Oct. 1867.
L. gracilis, Jay. Hald. Monog. 50, t.
13, f. 21.

Binney, l. c. 69.

(Jay's name preoccupied by Ziethen 1830.)

No. 36.

 POMPHOLINÆ.

- 12—14. POMPHOLYX EFFUSA, Lea. Proc.
Philad. Acad. viii, 80, 1856.

Binney, l. c. 74.

No. 1.

Genus P H Y S A , *Draparnaud*.

For description of the soft parts, see Haldeman's Monograph, p. 20. Prof. Haldeman was not aware that *Ph. hypnorum* differs from the other species in the mantle margin being without digitations, hence his remark that "The animal is distinguished from *Limnea* by the digitated mantle," etc., must be understood to apply to the genus *Physa* as restricted by subsequent authors.

The argument of Prof. H. (p. 22) in favor of retaining *Physa* instead of the older name *Bulinus* on the score of expediency would find no favor at the present day, and the latter name would have been adopted long since had it not been discovered that the animal, instead of being the same, is generically distinct.

The following subgenera of *Physa* are admitted,—none of them containing many species :

PHYSELLA, Haldeman. *Shell globose, spire short; aperture elongate, very wide; columella with the fold well marked.*

The peculiar globosely inflated form of this genus recalls forcibly the genus *Amphipoeplea*, from which it differs principally in being sinistral.

PHYSODON, Haldeman. *Shell solid, smooth, elliptical; outer lip thick; columella toothed.*

ISIDORA, Ehrenberg. *Shell ovate, umbilicated; columella without a fold.*

AMERIA, H. Adams. *Shell with the whorls flattened, and angulated or carinated at the posterior part (spire); spire short, depressed. This subgenus, proposed in 1861 for a group of Australian species, may also receive a single American species, Ph. scalaris, Jay.*

COSTATELLA, Dall. *Shell oblong, covered with longitudinal elevated equidistant ribs. Soft parts unknown.*

Typical species.

I. SPECIES INHABITING THE PACIFIC STATES.

A. *Smooth species.*1. PHYSA LORDI, *Baird.*

Plate 6, fig's. 1, 2.

Shell thin, quite large, corneous, tumid, gibbous, aperture large, outer lip acute; external surface very minutely decussated; whorls six, the first two minute, tinged with black, the last swollen, four times the size of the others.

Length 19 to 25, diam. 12 to 19 mill.

This species is one of the largest of the genus, and is much swollen and gibbous.

Lake Osoyoos, British Columbia; Washington Territory; Humboldt Lake, Nevada.

In his remarks upon this species Professor Baird states that *Physa heterostropha*, Say, "abounds in the Sumass Prairie on the Fraser River;" but he has mistaken some other species for it, as *Ph. heterostropha* has not yet

been detected in the waters of the Pacific States and Territories.

2. PHYSA TRASKII, *Lea*.

Plate 7, fig. 4.

Shell very much inflated, somewhat oblique, striate, semi-transparent, very thin, pale chestnut color; spire somewhat produced, pointed at the apex; sutures impressed; whorls six, the last one very large and very much inflated; aperture broadly expanded; outer lip acute, and within the margin brown-banded; columella impressed in the middle and furnished with a large fold.

Length 19, diam. 12 mill.

Rio Los Angeles, California.

3. PHYSA AMPULLACEA, *Gould*.

Plate 6, figs. 5, 6.

Shell large, ovate-ventricose, thin, fragile, shining, horn-colored; spire elevated, acute;

whorls six, last one inflated; suture decidedly impressed; aperture broadly ovate, five-sixths the length of the shell; labrum thin, submargined with red; columella quite flexuous, covered with callus.

Length 25, diam. 13 mill.

Oregon; Washington Territory.

Distinguished by its large size, inflated form, and delicate structure; sometimes the form is somewhat cylindrical. Mr. Binney's figure 133 does not represent this species, but *Ph. Traskii*, Lea. Figure 6 represents a somewhat distorted specimen.

4. PHYSA GABBII, Tryon.

Plate 6, figs. 3, 4.

Shell large, thin, closely striated by the lines of growth; body whorl inflated, its upper half flattened, so that the labrum appears angulated in the middle; spire moderate, apex acute, whorls six, convex, with distinct sutures. Color light corneous, very much polished within; lip margined with red.

Length 25, diam. 13 mill.

California.

The peculiar feature in this species is the flattening of the superior half of the body whorl; it is not so strikingly apparent in some specimens as in the type.

5. PHYSA CONIFORMIS, *Tryon*.

Plate 7, fig. 1.

Shell obovate or somewhat cone-shaped, the spire very short, with an acute black-tipped apex; body whorl round, shouldered above, inflated, but becoming narrower below, while the long, somewhat ear-shaped aperture is broadly rounded below, causing the shell to resemble strikingly in outline *Conus tulipa*, Linn.; whorls five, the first ones minute; suture well impressed, lines of growth close and fine, surface polished, texture moderately thin, translucent. Color greyish-white, the lip slightly thickened and colored red; columella appressed, twisted and turned back at base.

Length 16, diam. 9.5 mill.

Humboldt River, Oregon.

6. PHYSA OCCIDENTALIS, *Tryon*.

Plate 6, fig. 18.

Shell with well-rounded whorls, suture impressed; spire moderate, sometimes short; apex acute; texture rather thin, surface crowded with growth-lines, polished, amber-colored; aperture moderately large, outer lip well rounded, thickened within and tinged with red; columella white, indented, somewhat folded, sharp-edged, curved to the right and forwards into a sort of beak at the base.

Length 18, diam. 11 mill.

California, Oregon.

This species, widely diffused throughout the Pacific States, appears to replace the eastern *Ph. heterostropha*, with which it has been generally confounded. It may be readily distinguished from that shell, however, by the very different form of the columella; so profoundly indented above, and so sharp, twisted and curving forwards towards the base.

Viewed from the right side, the form of shell and columella forcibly remind one of *Limnea emarginata*, Say.

7. PHYSA PROPINQUA, Tryon.

Plate 6, fig. 13.

Shell large, fragile, inflated; spire short, apex acute; body whorl almost shouldered, very large, covered with distinctly elevated lines of growth on the adult specimens; the surface frequently exhibits several planes, instead of being uniformly rounded; aperture large, oval, outer lip regularly rounded; columella a little twisted.

Length 19, diam. 13 mill.

Jordan Creek, S. W. Idaho.

This species has a shorter spire, its sutures are *not* well impressed, it has fewer whorls, is more ventricose, more solid, and is a smaller shell than *Ph. ampullacea*, Gould. *Ph. Lordi*, Baird, is still more ventricosely inflated, and the columella is not twisted.

8. PHYSA VIRGINEA, *Gould.*

Plate 6, fig. 7.

Shell slender and delicate, thin and shining, of a light golden color when fresh; spire about one-third the length of the shell, sharply pointed, of five or more moderately convex whorls, the last of which has a faintly angular appearance near the suture. Aperture narrow and elongated, two-thirds the length of the shell, acute behind. Columella short, delicate, slightly sinuate, folded.

Length 15, diam. 8 mill.

A slender, graceful species, not very closely related to any of its congeners. The long slender spire reminds one remotely of *Ph. hypnorum*, Linn.

9. PHYSA DIAPHANA, *Tryon*.

Plate 6, fig. 15.

Shell smooth, oval, lengthened; spire of moderate length, suture impressed; body whorl four-fifths of the entire length, somewhat cylindrical, very fragile, growth lines crowded, but minute; columellar lip very short, commencing low down, very much appressed and much twisted to the right towards the base, polished and very pearly.

Length 13, diam. 7 mill.

California.

Resembles *Ph. sparsestriata*, nob., in form, but is at once distinguished from that species by being smoother, with the growth lines more crowded, and from that and all other Physæ by the very peculiar columella, which curves diagonally to the right at such an angle as to make it appear almost truncate.

10. PHYSA BLANDI, *Lea.*

Plate 7, fig. 3.

Shell ovately fusiform, somewhat oblique, inflated, pale straw-color or whitish; spire obtuse; sutures impressed; whorls four, the last one inflated and very large; aperture ovate, rather large; outer lip expanded, within the margin thickened and pure salmon; columella thickened, impressed, folded and twisted.

Length 12, diam. 7·5 mill.

California.

A pretty little species, with no greatly marked distinctive characters.

11. PHYSA POLITISSIMA, *Tryon.*

Plate 6, fig. 17.

Shell oval, spire very short, with the suture scarcely impressed; surface very smooth,

highly polished; aperture moderate, ear-shaped; labrum regularly curved, not thickened internally; columella much indented at its insertion, scarcely folded, narrow, white, first vertical, then truncately turning to the right towards the base.

Length 11, diam. 6 mill.

Sacramento and Marysville, California.

This shell in appearance is singularly graceful and pleasing. Its very smooth, shining surface, unmarked by growth-lines, and its indented columella, are the most prominent distinctive characters.



12. PHYSA NUTTALLII, *Lea.*

Plate 7, fig. 2.

Shell inflated, rather thin, semi-transparent, somewhat bright, whitish; spire obtuse, short; sutures impressed; whorls four, convex, the last one large and inflated; aperture large, rounded, pale brown within the margin;

outer lip sharp and very much expanded ; columella slightly thickened and twisted.

Length 10, diam. 6·5 mill.

Lewis' River, Oregon.

This species differs from all other American *Physæ* in having a regularly arched outer lip. It approaches Say's *ancillaria*, but it has not the shoulder, and is rather more oblique. It seems to be quite a different species from *concolor*, Hald., also brought by Prof. Nuttall from Oregon.

13. PHYSA CONCOLOR, *Haldeman*.

Monog. p. 30, t. 2, fig. 10.

This species is doubtless identical with some of the other western species, but the single type is entirely too small for identification.

* *Cylindrical species.*

14. PHYSA VENUSTA, *Lea.*

Plate 7, fig. 5.

Shell subcylindrical, very thin, transparent, shining, white; spire short, pointed; sutures slightly impressed; whorls four, slightly convex, the last one very large; aperture large, elongately ovate, within the margin brownish; outer lip acute, sinuous and slightly expanded; columella slightly impressed.

Length 14, diam. 6·5 mill.

Oregon.

This species is a member of the group to which *Ph. gyrina*, Say, belongs; it is larger, however, paler in tint, and the lip is more arched.

15. PHYSA TRITICEA, *Lea*.

Plate 6, fig. 12.

Shell subfusiform, pellucid, shining, reddish-chestnut; spire short, rather pointed; sutures slightly impressed; whorls four, somewhat constricted; aperture elongate, lined within.

Length 6·5, diam. 3·8 mill.

California.

** *Shell ornamented by white longitudinal bands.*

16. PHYSA VIRGATA, *Gould*.

Plate 6, fig. 11.

Shell moderate, solid, smooth, elongate-ovate, olivaceous, with longitudinal white stripes; spire elevated, acute; whorls four to five, well separated; aperture lunate, two-thirds the shell's length; columella moderately folded, but with a heavy callus, within yellowish-red.

Length 10, diam. 6 mill.

Gila River, and near San Diego and Los Angeles, California.

* * * *Whorls shouldered.*

17. PHYSA HUMEROSA, *Gould.*

Plate 6, figs. 8, 9, 10.

Shell subrhomboidal, solid, smooth and white; spire acute; whorls five, tabulated; aperture equaling one-half to two-thirds the shell's length, rounded posteriorly; labrum expanded; columella scarcely plicate, callus hardly perforated.

Length 15, diam. 9 mill.

Colorado Desert.

The whorls are not regularly tabulated as in certain Australian species and like *Ph. scalaris*, but are simply perceptibly shouldered.

B. *Shell malleated.*

18. PHYSA MALLEATA, Tryon.

Plate 7, fig. 6.

Shell cylindrical or lengthened-oval, malleated, smooth, much polished, amber-colored; spire moderate, suture not well impressed; aperture somewhat ear-shaped, narrow above, wide and broadly rounded below; columella narrow, turned to the right, tinged with pink, as well as the outer lip.

Length 12, diam. $6\frac{1}{2}$ mill.

Oregon.

This species does not very closely approach any of the preceding. *Ph. propinqua* is occasionally somewhat malleated, but with this its resemblance ceases entirely. It is more closely related to the following, but differs in having the columella tinged with pink, in having a wider aperture and a shorter spire. The two species come from far distant localities.

19. PHYSA DISTINGUENDA, *Tryon.*

Plate 6, fig. 16.

Shell variable in outline, sometimes cylindrical, sometimes more inflated, lengthened; whorls somewhat longer than in the last species; whorls convex, suture well impressed; surface malleated, crowded with growth-lines; aperture long and narrow, rather wider below, umbilicus long and narrow, white, almost without fold, turned a little to the right below.

Length 13, diam. 7 mill.

Marysville and Stockton, California.

The differences between this and the preceding species have already been pointed out.

C. *Shell conspicuously striate.*

20. PHYSA SPARSESTRIATA, *Tryon.*

Plate 7, fig. 7.

Shell ovately cylindrical, spire rather produced, apex acute, suture well impressed; surface malleated and covered with distant sharp, raised growth-lines; texture quite fragile; outer lip not thickened; columella narrow and turning somewhat to the right towards the base, very slightly or not at all folded.

Length 12, diam. 7 mill.

San Joaquin Valley, California.

This species somewhat resembles in its striae *Ph. D'Orbignyana*, Lea, but does not otherwise accord with that shell. It is much more slender, more fragile, and has a longer spire than *Ph. heterostropha*, Say. In form it is somewhat like *Ph. virginea*, Gould; but that is a smooth, polished species, of a richer color, frequently almost golden in hue. It is a very distinct shell, of very constant character.

21. PHYSA D'ORBIGNYANA, *Lea*.

Plate 7, fig. 8.

Shell broadly oval, obliquely inflated, widely striate, semi-transparent, very fragile, dove-color; spire rather obtuse; whorls five, the last very large; aperture very large, broadly elliptical; outer lip regularly expanded, thickened and pale saffron color under the margin; columella impressed and slightly thickened in the middle, and furnished with a fold.

Length 14, diam. 8 mill.

Salt Lagoon, near Monterey, California.

This species is interesting from the fact of its inhabiting water which is quite salt. It is very near in outline to *heterostropha*, Say, but it is a rather smaller, thinner species, not quite so long in proportion, and the longitudinal striæ distinguish it at once. These striæ are rather coarse and distant, and the whole surface of the whorls is covered over with minute parallel striæ. The aperture is about three-fourths the length of the shell.

22. PHYSA COOPERII, *Tryon*.

Plate 6, fig. 14.

Shell small, ovate, rather solid, not inflated; body whorl somewhat flattened above the middle, and nearly the entire length of the shell; spire very short, eroded, suture not well impressed; surface roughly striate; columella nearly straight, without fold; lip bordered internally with red.

Length 8, diam. 4·5 mill.

N. E. California.

It can scarcely be mistaken for any other species, being peculiar for its small size, solidity and heavy deposit within the labrum.

. SPECIES INHABITING THE STATES EAST OF THE
ROCKY MOUNTAINS.

A. *Inflated species.*

23. PHYSA ANCILLARIA, *Say.*

Plate 8, fig. 1.

Hald., Monog., p. 27, t. 3, figs. 1 to 8, 10 (excl. 9).

The form of this shell is generally obovate, the upper part of the body whorl being round shouldered. I have figured a fine typical form from Moravia, N. Y. (fig. 1.)

24. PHYSA SAYII, *Tappan.*

Ph. ancillaria (part), Hald., t. 3, fig. 9.

Physa Warreniana, Lea. Plate 8, fig. 2.

Shell ovate much inflated, color brownish-yellow or chestnut; whorls five; the first large, the others small, terminating in a minute dark brown apex; aperture large, four-fifths of the length of the shell, translucent.

Length 25, diam. 17·5 mill.

Lake Pipin, Ohio, original loc. ; Michigan to Missouri.

I agree with Mr. W. G. Binney that this is distinct from *P. ancillaria*, with which it has been confounded by Haldeman. It is more regularly oval, without shoulder, smoother, and more polished and translucent. Tappan's description and figure seem to have been neglected by all recent students, and the species, although so perfectly distinct and of such numerous occurrence in the north-western States, has been confounded with *ancillaria*. To Dr. Lea belongs the honor of re-discovery, but his specific name must yield to the prior one given by Tappan.

25. PHYSA VINOSA, *Gould*.

Plate 8, fig. 3.

Shell thin, ovate-globose, red, spire very short, obtuse ; whorls four, the last very much inflated ; aperture broadly ovate-lunate, three-

fourths the shell's length, liver-brown within ; columella straight and thin.

Length 19, diam. 12·5 mill.

Lake Superior.

A remarkably inflated species, most like *P. ancillaria* or *P. Sayi* ; it is well distinguished by its more globose form, and its peculiar color.

26. PHYSA HETEROSTROPHA, *Say*.

Hald. Monog. 23, t. 2, figs. 1—9.

With this species, following Mr. Binney, I unite *Ph. plicata*, DeKay, but I incline to consider *Ph. inflata*, Lea, distinct, or at least its identity is not proven. As for *Ph. cylindrica*, Newcomb, and *Ph. aurea*, Lea, they are both of very different affinities, and are wrongly placed in the synonymy of *Ph. heterostropha* by Mr. Binney.

27. PHYSA INFLATA, *Lea*.

Plate 8, fig. 4.

Shell inflated, dark, somewhat pellucid; spire somewhat elevated, acutely conical; whorls five; outer lip margined and inflated; aperture wide.

Length 16, diam. 12 mill.

Virginia, between the Salt Sulphur and Sweet Springs.

It is perhaps most nearly allied to *Ph. heterostropha*, Say, but has a shorter aperture and is more inflated.—*Lea*.

28. PHYSA FRAGILIS, *Mighels*.

Hald. Monog. 31, t. 4, figs. 11—13.

Shell very thin and fragile, translucent, horn-color, obliquely ovate; whorls four; last whorl campanulate, suture deeply impressed at the enlargement of the last whorl; spire

sometimes only one-fourth part of the length of the shell; labrum very thin, advanced; labium tumid, with a thin, loosely adherent lamina.

Animal of a very obscure light green color; whole surface of the body covered with oblong dark spots; foot shorter than the shell, lanceolate; tentacles nearly white, rather long, very slender; mouth blood-red. Its motions are exceedingly rapid; very timid, withdrawing itself on the least alarm.

Length 14, diam. 10 mill.

Monmouth, Maine.

No other authenticated locality has been discovered, and it has been stated that the species is *Ph. heterostropha*,—the normal growth yielding to the influence of water surcharged with saw-dust from a neighboring mill. Admitting the influence of the saw-dust in causing the loose deposit of the labrum, I still incline to consider it a very distinct species.

29. PHYSA HETEROSTROPHA, Say.

Hald. Monog. p. 23, t. 2, figs. 1—9.

Physa osculans, in part, Hald., t. 2, figs. 11, 12.

Physa plicata, DeKay. Plate 8, fig. 7.

Mr. W. G. Binney includes also in the synonymy of this species *P. aurea*, Lea, which I believe to = *P. Troostiana*, Lea, and *P. cylindrica*, Newcomb, which I consider a synonym of *P. gyrina*, Say. *P. inflata*, Lea, also placed here by Mr. Binney, is very probably distinct from all other species, and I have so treated it. In conclusion, Mr. B. includes in his catalogue of specimens in the Smithsonian Museum several lots having west-coast localities, and none of these are really *P. heterostropha*, which does not extend westward of the great plains and Rocky Mountains. *P. heterostropha* very rarely extends westward of the Mississippi River or southward of the Ohio and Potomac, and even at these boundaries it is largely replaced by other species.

30. PHYSA POMILIA, *Conrad*.

Plate 8, fig. 9.

Physa Showalterii, *Lea*. Plate 8, fig. 10.

Shell somewhat fusiform, rather inflated, semi-transparent, rather thin, pale horn-color; spire somewhat produced, pointed at the apex; sutures very much impressed; whorls five, convex, the last one large; aperture large, elliptical; outer lip regularly expanded, thickened and saffron-color under the margin; columella much impressed and thickened in the middle, twisted and furnished with a fold.

Length 12, diam. 6·5 mill.

Uniontown and Claiborne, Ala.

The above is a copy of Mr. Lea's description, which is much more satisfactory than the meagre one published by Mr. Conrad thirty years before it. Mr. Conrad's type specimen agrees very well with the description, figure and specimens of *P. Showalterii*.

31. PHYSA LATA, *Tryon*.

Plate 8, fig. 11.

Shell very fragile, light horn-color, waxy, irregularly striate; spire moderately elevated; whorls convex; apex acute; suture well impressed; body inflated; aperture rather large, columellar lip turned to the right, very narrow, distinctly folded.

Length 10·5, diam. 7 mill.

Juniata River, Hollidaysburg, Penna.

This species has very much the form of *Ph. heterostropha*, but is rather more ventricose, much thinner, and the surface exhibits a peculiar glimmering lustre. It is more like *Ph. osculans*, Hald., in its texture, color, and lustre, but the latter is a much larger species.

32. *PHYSA CROCATA*, *Lea.*

Plate 9, fig. 1.

Shell elliptical, somewhat thin, shining, light yellow-saffron; spire obtuse; sutures impressed; whorls four, the last one large and somewhat inflated; aperture elliptical; outer lip acute, saffron-banded under the margin; columella thickened, impressed and twisted in the middle.

Length 12·5, diam. 7·5 mill.

Lafayette, Walker County, Georgia.

33. *PHYSA WHITEI*, *Lea.*

Plate 8, fig. 15.

Shell somewhat inflated, thin, somewhat transparent, somewhat shining, whitish; spire rather acute; sutures very much impressed; whorls four, convex, the last one large and somewhat inflated; aperture elliptical, thick-

ened and pale salmon within the edge; outer lip thickened and somewhat constricted; columella impressed and twisted.

Length 10, diam. 6 mill.

Lafayette, Walker Co., Kansas, and Verdigris River, Texas.

34. PHYSA FORSHEYI, *Lea*.

Plate 9, fig. 2.

Subfusiform, rather thick, rather opaque, yellowish horn-color; spire exerted, pointed; sutures very much impressed; whorls six, the last one large; aperture rather small, ovate and somewhat constricted; outer lip thickened and brown-banded within the margin; columella thickened, impressed in the middle and twisted.

Length 9, diam. 5 mill.

Rutersville, Texas.

35. PHYSA ANATINA, *Lea.*

Plate 9, fig. 3.

Shell subfusiform, somewhat inflated, transparent, thin, whitish; spire exerted, pointed; sutures very much impressed; whorls six, somewhat convex, the last one large; aperture rather small and somewhat constricted; outer lip a little expanded, thickened and saffron-color under the margin; columella impressed in the middle and twisted.

Length 12, diam. 6 mill.

Northern Tributary of the Arkansas River, Kansas.

A pretty species, but having no very marked characters to distinguish it from several of its allies.

36. PHYSA HALEI, *Lea.*

Plate 8, fig. 14.

Shell broadly oval, inflated, semi-transparent, thin, whitish; spire obtuse; sutures im-

pressed; whorls five, the last large; aperture rounded; outer lip regularly expanded, white and thickened within the margin; columella thickened and impressed in the middle, and furnished with a fold.

Length 13, diam. 8·5 mill.

Alexandria, La.

This species is nearly allied to *Ph. Warreniana*, but is smaller, and the spire more elevated; the columella also is more incurved towards its base.

37. PHYSA GROSVENORII, *Lea.*

Plate 8, fig. 13.

Shell ovately fusiform, nearly straight, somewhat inflated, white or pale straw-yellow, polished; spire somewhat exerted; sutures impressed; whorls five, the last one rather large; aperture oval, rather large; outer lip somewhat expanded, thickened under the margin; columella thickened, very much impressed, folded and very much twisted.

Length 7·5, diam. 5 mill.

Santa Rita Valley, Kansas.

Smaller, less inflated and having one more whorl than *Ph. Blandii*, which it otherwise closely resembles.

38. PHYSA BRÉVISPIRA, *Lea*.

Plate 8, fig. 8.

Shell smooth, broad elliptical, whitish, somewhat transparent, inflated; spire very short, obtuse, and scarcely exerted; whorls three, the last one large and inflated; outer lip acute, the inner margin being thickened; aperture very large and dilated; columella thickened, impressed and twisted.

Length 9, diam. 6·25 mill.

Ottawa River, Canada West.

More obtuse at the apex than *Ph. globosa*, Hald. The aperture is about six-sevenths the length of the shell.

39. PHYSA PRIMEANA, *Tryon*.

Plate 8, fig. 12.

Shell oval; spire but little elevated above the curve of the outline of the body whorl; apex rather acute; suture moderate; a little attenuated towards the base; aperture narrow, ear-shaped, broader and well rounded below; columellar lip turned a little to the right but well rounded. A broad, but thin deposit of callus on the body whorl connects the ends of the lip-margin. Surface smooth, polished, amber-colored; lip margined, and together with the columella tinged with red.

Length 9, diam. 6 mill.

Long Island.

In size and outline it is very near to *Niagarensis*, but differs in color, texture and in the direction of the columella.

40. PHYSA SOLIDA, *Phil.*

Plate 8, fig. 6.

Shell perforate, longitudinally ovate, solid, pale horn-color; whorls six, arched, apical whorls pointed, comprising one-third the whole length of the shell; mouth narrowed by the thickening of the lip; columella not folded.

Length 15, diam. 10 mill.

New Orleans.

The number of whorls and inflated form together with its solidity will serve to distinguish it from other species.

Mexican Species.

There are quite a number of these, and I would have omitted them entirely from this work if none had been included in the monographs of Haldeman and Binney. I confine my remarks to those species only mentioned by above authors.

a. PHYSA OSCULANS, *Hald.*

Hald. Monog. p. 29, t. 2, f. 13 (excl. f. 11, 12).

This is certainly a Mexican, not an Indian species, and belongs to the genus *Bulinus*.

b. PHYSA MEXICANA, *Philippi*.

Plate 7, fig. 12.

Shell imperforate, ovate, inflated, light horn color, thin, dull and not shining, very finely wrinkled; the apical whorls occupy one-fourth of the entire length; mouth wide; columellar fold broadly expanded, almost in the centre of the aperture.—*Binney*.

Length 19, diam. 12 mill.

This is a true *Physa*, and to it are referable specimens in the collection of the Academy at Philadelphia as well as in many public and private collections which have been labelled *Ph. osculans* on account of some resemblance to Haldeman's figures 11 and 12 which are named *osculans*, but really represent *heterostropha*.

c. PHYSA SEMIPLICATA, *Küster*.

Binney, p. 90, f. 154.

I have not figured this species because it belongs to the Australasian type of the genus, and no evidence is presented by the author which would induce me to regard it as possibly American.

B. *Cylindrical Species*.

41. PHYSA GYRINA, *Say*.

Hald. Monog. 32, t. 3, figs. 1—6.

Physa cylindrica, Newcomb. Plate 9, fig. 4.

Physa Hildrethiana, Lea. Plate 9, fig. 5.

Physa Hawaii, Lea. Plate 9, fig. 6.

Physa Saffordii, Lea. Plate 9, fig. 7.

Physa parva, Lea. Plate 9, fig. 8.

The above is a tremendous synonymy, but I am utterly unable to find any characters by which either of the above species shall be sep-

arated. Mr. W. G. Binney includes *Ph. elliptica* herein, but I believe it to be distinct and have so treated it. It is a species of wide distribution, but rarely found on the coast side of the Allegheny mountains. It extends westward to Kansas and Nevada, and southward from Michigan to Alabama.

42. PHYSA ELLIPTICA, *Lea.*

Plate 9, fig. 9.

Physa aurea, *Lea.* Plate 9, fig. 10.

Physa Troostiana, *Lea.* Plate 9, fig. 11.

Physa oleacea, *Tryon.* Plate 9, fig. 12.

Physa Febigeri, *Lea.* Plate 9, fig. 13.

Physa Nicklinii, *Lea.* Plate 9, fig. 14.

Physa Altonensis, *Lea.* Plate 9, fig. 15.

Shell completely oval, with the outline of the spire not elevated above a continuation of the general curve of the body; spire very short, apex minute, suture linear, but margined; whorls four, rapidly increasing, the last large, narrowly oval; aperture long and

narrow, the lip much thickened within; columnar lip heavy, polished, slightly twisted and turned back; texture thin, diaphanous, surface almost unmarked by growth-lines, brilliantly polished, and bright oil-colored; columella tinged with pink, lip margined with dark red.

Length 12, diam. 7 mill.

Western and Southern States.

This species, of which I have seen numerous examples of all ages, is much shorter in the spire, more oval, and differently colored from *Ph. gyrina*, Say. *Ph. brevispira*, Lea, is differently colored and more inflated, and finally *Ph. Primeana*, nob., is a smaller species, with distinct striæ, longer spire and more inflated. It is, I think, the most beautiful species of the genus yet detected in the United States.

The above is my description of *Ph. oleacea*, which I reproduce here as a pretty full characterization of the species in which mine merges as a synonym.

43. PHYSA SMITHSONIANA, *Lea*.

Plate 7, fig. 9.

Shell elliptical, rather thin, translucent, shining, pale-brown, almost olivaceous; spire rather acute; sutures impressed; whorls five, somewhat convex, the last one large and somewhat constricted; aperture elongately elliptical; outer lip somewhat thickened and dark brown under the margin; columella impressed and twisted.—*Lea*.

Length 12, diam. 6 mill.

Loup Fork of Platte River.

44. PHYSA DEFORMIS, *Currier*.

Plate 9, fig. 16.

Shell small, narrowly ovate, thick; whorls four, well rounded, the last not proportionately enlarged but somewhat flattened, which, in connection with its well-rounded whorls,

gives the shell a deformed appearance. A broad, thick deposit of callus on the body whorl extends to the base of the columellar lip, which is twisted and appressed.

Length 10, diam. 4 mill.

Grand Rapids, Mich.

Subgenus PHYSELLA, *Haldeman*.

44. PHYSA GLOBOSA, *Hald.*

Monog. p. 38, t. 5, fig. 10—12.

Subgenus PHYSDON, *Haldeman*.

45. PHYSA MICROSTOMA, *Hald.*

Monog. p. 39, t. 4, fig. 13—14.

Subgenus ISIDORA, *Ehrenberg*.

46. PHYSA INTEGER, *Hald.*

Monog. p. 33, t. 4, f. 7—8.

Physa Niagarensis, Lea.—Plate 8, fig. 5.

I cannot detect the slightest difference between Mr. Lea's species and the previously published *integer*. It is a very common shell in the Great Lakes and St. Lawrence River, but becomes rarer to the southward, and has not been reported south of Tennessee.

47. PHYSA DISTORTUS, *Haldeman*.

Monog. p. 35, t. 5, f. 1—3.

Subgenus AMERICA, *H. Adams*.

48. PHYSA SCALARIS, *Jay*.

Hald., Monog. p. 34, t. 4, f. 9.

See my remarks on the subgenus *Ameria*,
ante p. 126.

Specimens have been collected at Tampa
Bay, Florida.

Subgenus COSTATELLA, *Dall*.49. PHYSA COSTATA, *Newcomb*.

Plate 7, figs. 10, 11.

Shell ovate globular, horn-color or reddish
corneous; whorls four, the last inflated and
roundly angulated above, armed with ten to
fourteen prominent longitudinal ribs; apex
acute; spire short; aperture ovate.

Clear Lake, California.

Genus BULINUS, *Adanson*.

1. BULINUS HYPNORUM, *Linn*.

Haldeman, Monog. p. 36, t. 5, figs. 4—9.

Physa glabra, DeKay.—Plate 9, f. 17.

There is no doubt of the identity of our shell with the common European species bearing the above name. The species is very widely distributed east of the Rocky Mountains but does not appear to inhabit the Pacific Coast States.

2. BULINUS TRYONI, *Currier*.

Plate 7, fig. 18.

Shell cylindrical, smooth, dark horn color; whorls 6, flatly rounded; aperture one-half the length of the shell, pink within; columella twisted, with a light callus.

Length 18, diam. 6 mill.

Grand Rapids, Mich.

This shell differs from *B. hypnorum* by its larger size, less attenuated spire, more twisted columella and its uniform pink aperture.

3. BULINUS HORDACEUS, *Lea.*

Plate 7, fig. 19.

Shell subcylindrical, somewhat transparent, polished, pale reddish; spire somewhat raised, rather pointed; sutures somewhat impressed; whorls five, the last large and constricted; outer lip acute, with a reddish line on the margin; aperture ovate, with an acute angle above; columella somewhat impressed and slightly thickened.

Length 6·5, diam. 3·2 mill.

Oregon.

This is a much smaller species than any others in the genus, and differs also in its short spire.

4. B. BERLANDIERIANUS, *W. G. Binney.*

Plate 7, fig. 17.

Shell cylindrical, smooth, whitened, rather thick; whorls five, the upper ones narrowly flattened, the lower one comprising more than 15—17 of the total length of the shell; quite compressed; aperture very long, narrow, columella simple, with a slight callus.

Length 17, diam. 8 mill.

Near Matamoras, Texas.

5. BULINUS TENUISSIMUS, *Lea.*

Plate 7, fig. 16.

Shell subfusiform, exceedingly thin, very fragile, transparent, shining, whitish; spire produced; sutures scarcely impressed; whorls four, slightly convex, the last one very large and somewhat compressed; aperture large,

elongately ovate; outer lip slightly expanded; columella thin and slightly twisted.

Length 14, diam. 6·2 mill.

Alexandria, Louisiana.

The above was described from a single broken specimen, and therefore its claims to specific rank must remain somewhat doubtful, although it looks very unlike any other species with which I am acquainted.

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Extra-limital Species.

a. BULINUS AURANTIUS, *Carpenter.*

Habitat.—Mazatlan, Mexico.

—

b. BULINUS ELATUS, *Gould.*

Plate 7, fig. 14.

Habitat.—Lower California and Mazatlan, Mexico.

c. BULINUS NITENS, *Philippi?*

Plate 7, fig. 15.

I have figured a shell found at Vera Cruz, which may be the above species, not entirely mature. The original figure of *nitens*, which is accurately copied in Binney's work, f. 168, appears to be drawn from an abnormal specimen.



Subfamily *POMPHOLINÆ*, Dall.

Shell depressed, few-whorled, the last whorl the largest, without fold on the columella. Inoperculate. Animal, foot rounded, tentacles long, eyes situated at the outer bases of the tentacles.

Genus POMPHOLYX, *Lea.*

Shell dextral, depressed-globose, translucent, horn-colored; spire short, obtuse, last whorl very wide, ventricose; aperture very large, wide, subcircular, expanded; inner lip thickened, outer lip acute.

1. POMPHOLYX EFFUSA, *Lea.*

Plate 18, figs. 12, 13, 14.

Shell small, roundly gibbous, rather thin, effuse, reddish horn-colored or greenish, whorls five, flattened above, convex below; aperture sub-rotund, dilated, within white.

Length 6, diam. 8 mill.

California.

PHYSA.

SYNONYMY AND REFERENCE TO
P L A T E 6 .

Fig.

- 1, 2. PHYSA LORDI, Baird. London Zool.
Proc. 68, 1863.
Binney, Land and F. W. Shells, pt. 2,
p. 76, 1865. **No. 1.**
- 3, 4. P. GABBI, Tryon. Proc. Acad. Nat. Sci.
Philad. 149, t. 1, f. 14, 1863.
Binney, l. c. 77. **No. 4.**
- 5, 6. P. AMPULLACEA, Gould. Binney, l. c. 79.
P. bullata, Gould. Proc. Bost. Soc.
Nat. Hist. v, 128, 1855. Pre-occu-
pied by Potiez et Mich. **No. 3.**
7. P. VIRGINEA, Gould. Proc. Bost. Soc. Nat.
Hist. ii, 215, 1847.
Binney, l. c. 92. **No. 8.**

- 8—10. *P. HUMEROSA*, Gould. Proc. Bost. Soc.
Nat. Hist. v, 128, 1855.
Binney, l. c. 92. **No. 17.**
11. *P. VIRGATA*, Gould. Proc. Bost. Soc. Nat.
Hist. v, 128, 1855.
Binney, l. c. 93. **No. 16.**
12. *P. TRITICEA*, Lea. Proc. Acad. Nat. Sci.
Philad. viii, 80, 1856.
Observ. xi, 132, t. 24, f. 103. **No. 15.**
13. *P. PROPINQUA*, Tryon. Am. Jour. Conch.
i, 223, t. 23, f. 5, 1865. **No. 7.**
14. *P. COOPERI*, Tryon. Am. Jour. Conch. i,
224, t. 23, f. 9, 1865. **No. 22.**
15. *P. DIAPHANA*, Tryon. Am. Jour. Conch.
i, 224, t. 23, f. 11, 1865. **No. 9.**
16. *P. DISTINGUENDA*, Tryon. Am. Jour.
Conch. i, 225, t. 23, f. 6, 1865.
No. 19.
17. *P. POLITISSIMA*, Tryon. Am. Jour. Conch.
i, 226, t. 23, f. 13, 1865. **No. 11.**
18. *P. OCCIDENTALIS*, Tryon. Am. Jour.
Conch. i, 226, t. 23, f. 8, 1865.
No. 6.

PHYSA.

SYNONYMY AND REFERENCE TO
PLATE 7.

Fig.

1. *PHYSA CONFORMIS*, Tryon. Am. Jour.
Conch. ii, 6, t. 2, f. 5, 1866. No. 5.
2. *P. NUTTALLII*, Lea. Proc. Philad. Acad.
116, 1864.
Observ. xi, 127, t. 24, f. 93. No. 13.
3. *P. BLANDI*, Lea. Proc. Philad. Acad. 116,
1864.
Observ. xi, 124, t. 24, f. 88. No. 10.
4. *P. TRASKII*, Lea. Proc. Philad. Acad. 115,
1864.
Observ. xi, 119, t. 24, f. 80. No. 2.
5. *P. VENUSTA*, Lea. Proc. Philad. Acad. 116,
1864.
Observ. xi, 124, t. 24, f. 89. No. 14.

6. *P. MALLEATA*, Tryon. Am. Jour. Conch. i,
225, t. 23, f. 14, 1865. **No. 18.**
7. *P. SPARSESTRIATA*, Tryon. Am. Jour.
Conch. i, 224, t. 23, f. 10, 1865.
No. 20.
8. *P. D'ORBIGNYANA*, Lea. Observ. xi, 122, t.
24, f. 85.
P. striata, Lea (not Orb.) Proc.
Philad. Acad. 115, 1864. **No. 21.**
9. *P. SMITHSONIANA*, Lea. Proc. Philad.
Acad. 115, 1864.
Observ. xi, 125, t. 24, f. 91. **No. 43.**
- 10, 11. *P. COSTATA*, Newcomb. Proc. Cal.
Acad. ii, 104.
Binney, l. c. 91. **No. 49.**
12. *P. MEXICANA*, Philippi. Küster's Chem-
nitz, 5, t. 1, f. 3, 4.
Binney, l. c. 84. **B.**

BULINUS.

13. BULINUS AURANTIUS, Carpenter. Mazat.
Cat. 179, 1856.
Binney, l. c. 98. **A.**
14. B. ELATUS, Gould. Bost. Jour. Nat. Hist.
vi, 379, t. 14, f. 4, 1853.
Binney, l. c. 99. **B.**
15. B. NITENS? Philippi. Küster, Conch.
Cab. Monog. 5, t. 1, f. 1, 2.
Binney, l. c. 98. **C.**
16. B. TENUISSIMA, Lea. Proc. Philad. Acad.
114, 1864.
Observ. xi, 123, t. 24, f. 86. **No. 5.**
17. B. BERLANDIERIANUS, W. G. Binney. Am.
Jour. Conch. i, 51, t. 7, f. 8, 1865.
Binney, l. c. 155. **No. 4.**
18. B. TRYONI, Currier. Am. Jour. Conch.
iii, 112, t. 6, f. 2, 1867. **No. 2.**
19. B. HORDACEA, Lea. Proc. Philad. Acad.
116, 1864.
Observ. xi, 132, t. 24, f. 102. **No. 3.**

PHYSA.

SYNONYMY AND REFERENCE TO

PLATE 8.

Fig.

1. PHYSA ANCILLARIA, Say. Hald. Monog.
27, t. 3, f. 1—10.
Binney, l. c. 81. No. 23.
- P. SAYII, Tappan. Am. Jour. Science,
xxxv, 369, t. 3, f. 3, 1839.
Binney, l. c. 80.
P. ancillaria, Hald. (pars). Plate 8,
fig. 2.
2. *P. Warreniana*, Lea. Proc. Philad.
Acad. 115, 1864.
Observ. xi, 120, t. 24, f. 81. No. 24.
- (96)

3. *P. VINOSA*, Gould. Proc. Bost. Soc. ii, 263,
1847.
Binney, l. c. 80. No. 25.
4. *P. INFLATA*, Lea. Proc. Am. Philos. Soc.
ii, 32.
Binney, l. c. 88. No. 27.
- *P. INTEGER*, Hald. Monog. 33, t. 4, f. 7, 8.
5. *P. Niagarensis*, Lea. Proc. Philad.
Acad. 114, 1864.
Observ. xi, 129, t. 24, f. 97. No. 46.
6. *P. SOLIDA*, Phil. Küster's Chemnitz, 6, t.
1, f. 5, 6.
Binney, l. c. 91. No. 40.
- *P. HETEROSTROPHA*, Say. Hald. Monog. 23,
t. 2, f. 1—9.
7. *P. PLICATA*, DeKay. Moll. N. York, 78, t.
5, f. 85, 1843.
Binney, l. c. 84. No. 29.
8. *P. BREVISPIRA*, Lea. Proc. Philad. Acad.
116, 1864.
Observ. xi, 129, t. 24, f. 98. No. 38.
- (97)

9. *P. POMILIA*, Conrad. Am. Jour. Science,
xxv, 343, 1834.
Am. Jour. Conch. ii, 278, t. 15, f. 1—3,
1866.
10. *P. Showalterii*, Lea. Proc. Philad.
Acad. 115, 1864.
Observ. xi, 126, t. 24, f. 92. **No. 30.**
11. *P. LATA*, Tryon. Am. Jour. Conch. i,
227, t. 23, f. 7, 1865. **No. 31.**
12. *P. PRIMEANA*, Tryon. Am. Jour. Conch.
i, 227, t. 23, f. 14, 1865. **No. 39.**
13. *P. GROSVENORII*, Lea. Proc. Philad. Acad.
114, 1864.
Observ. xi, 131, t. 24, f. 100. **No. 37.**
14. *P. HALEI*, Lea. Proc. Philad. Acad. 114,
1864.
Observ. xi, 121, t. 24, f. 83. **No. 36.**
15. *P. WHITEI*, Lea. Proc. Philad. Acad. 114,
1864.
Observ. xi, 128, t. 24, f. 96. **No. 33.**

PHYSA.

SYNONYMY AND REFERENCE TO

PLATE 9.

Fig.

1. *PHYSA CROCATATA*, Lea. Philad. Proc. 114, 1864.
Observ. xi, 125, t. 24, f. 90. **No. 32.**
2. *P. FORSHEYI*, Lea. Philad. Proc. 114, 1864.
Observ. xi, 128, t. 24, f. 95. **No. 34.**
3. *P. ANATINA*, Lea. Philad. Proc. 115, 1864.
Observ. xi, 127, t. 24, f. 94. **No. 35.**
- *P. GYRINA*, Say. Hald. Monog. 32, t. 3, f. 1—6.
4. *P. cylindrica*, Newcomb. De Kay, Moll. N. York, 77, t. 5, f. 82, 1843.

(99)

5. *P. Hildrethiana*, Lea. Am. Philos. Proc. ii, 32, 1841.
6. *P. Hawni*, Lea. Philad. Proc. 115, 1864.
Observ. xi, 121, t. 24, f. 84.
7. *P. Saffordii*, Lea. Philad. Proc. 115, 1864.
Observ. xi, 123, t. 24, f. 87.
8. *P. parva*, Lea. Philad. Proc. 115, 1864.
Observ. xi, 133, t. 24, f. 104. **No. 41.**
9. *P. ELLIPTICA*, Lea. Trans. Am. Philos. Soc. v, 115, t. 19, f. 83, 1837.
10. *P. aurea*, Lea. Trans. Am. Philos. Soc. vi, 18, t. 23, f. 106, 1839.
11. *P. Troostiana*, Lea. Proc. Am. Philos. Soc. ii, 32, 1841.
Binney, l. c. 94.
12. *P. oleacea*, Tryon. Am. Jour. Conch. ii, 6, t. 2, f. 6, 1866.
13. *P. Febigerii*, Lea. Philad. Proc. 114, 1864.
Observ. xi, 130, t. 24, f. 99.

14. *P. Nicklinii*, Lea. Philad. Proc. 114,
1864.
Observ. xi, 131, t. 24, f. 101. No. 42.
15. *P. Altonensis*, Lea. Philad. Proc. 114,
1864.
Observ. xi, 120, t. 24, f. 82.
16. *P. DEFORMIS*, Currier. Am. Jour. Conch.
iii, 112, t. 6, f. 1, 1867. No. 44.



BULINUS.

- *B. HYPNORUM*, Linn. Hald. Monog. Physa,
36, t. 5, f. 4—9.
17. *Physa glabra*, DeKay. Moll. N. York,
80, t. 5, f. 83, 1843. No. 1.

Subfamily *PLANORBINÆ*.

Shell spiral, discoidal or depressed, many-whorled; aperture crescentic.

For description of the animal see Haldeman, p. 1.

Three genera embrace all the American species, which, unlike our *Physæ*, are readily recognised, being more sharply defined in their characters. These genera are :

1. *PLANORBIS*, Guettard. Shell dextral, discoidal; spire depressed, whorls numerous, visible on both sides; aperture crescentic or transversely oval, unarmed; peristome thin, incomplete, the upper margin produced.

2. *SEGMENTINA*, Fleming. Shell orbicular, depressed, furnished internally with testaceous partitions or teeth.

3. CARINIFEX, Binney. Shell dextral, spiral, inflated, angular, horn-colored; spire elevated, terraced; whorls numerous, angular, visible above; last whorl very large, broad above, very rapidly attenuated below; umbilicus funnel-shaped; aperture triangular, broad above, narrow below; inner lip slightly thickened; outer lip thin, acute, angular above, flexuose.

Mr. Binney places this genus between *Limnea* and *Physa*, but I think its characters place it decidedly in the Planorbinæ. I award priority to Mr. Binney's name over that of Mr. Lea, *Megasystropha*, although the *description* of the latter was the first published, because Mr. Binney's name was printed (although without description) and the type species indicated at a somewhat earlier date.

Genus PLANORBIS, *Guettard*.

Besides the typical group, the following well-founded subgenera have been adopted :

PLANORBELLA, Haldeman. Shell with the whorls few ; aperture expanded, campanulate or bell-shaped, prominent.

HELISOMA, Swainson. Shell ventricose, the spire sunk below the body whorl ; whorls few, often angulated.

ADULA, H. Adams. Shell with the whorls rounded and very numerous, deeply umbilicated on the upper, and convex on the under side ; aperture campanulate.

MENETUS, H. and A. Adams. Shell depressed ; whorls rapidly increasing, periphery angulated.

NAUTILINA, Stein. Shell small, orbicular above, flat beneath ; whorls few, rapidly increasing.

Typical Species.

The aperture in the plane of volution and not expanded.

A. WEST COAST SPECIES.

1. PLANORBIS SUBCRENATUS, *Carp.*

Plate 5, figs. 1, 2.

Shell tumid, very thin, horn-colored; whorls six, rounded, sutures impressed, with sharp radiating, somewhat crowded and occasionally minutely crenulated ridges; aperture rounded; parietal wall small, scarcely touching the penultimate whorl; labrum slightly deflected, fuscous within; umbilicus deep.

Diameter 23, alt. 9 mill.

Oregon. Washoe Mining District.

In its flatness this species resembles the *Pl. glabratus*, Say, of the Atlantic States, but it is larger and not nearly so smooth.

2. PLANORBIS HORNII, *Tryon*.

Plate 5, fig. 3, 4.

Shell large, consisting of three convex volutions; aperture almost orbicular, not oblique, nor extending above or below the plane of the whorls; labrum slightly reflected, thickened within, its ends converging so as nearly to connect on the parietal wall; lines of growth fine and close. Color light horn.

Diameter 21, alt. 7 mill.

Fort Simpson, British America. Dr. Geo. H. Horn.

Grant's Lake, California. W. M. Gabb.

Not so depressed as the preceding, smoother, the growth lines being much closer and but little elevated, and very different in the form of the aperture.

3. PLANORBIS TUMENS, *Carpenter*.

Plate 5, fig. 5, 6.

Shell rapidly swelling, small, horn or reddish smoke-colored; whorls four or five, with light waving striæ; sutures deeply impressed; on one side subangulate or subcarinate near the suture, on the other rounded; umbilicus very deep; aperture with a sinuous edge, one side standing out above, flattened below, the other flattened above, produced below, capacious and rounded; labium very thin.

Diam. 15, alt. 6·5 mill.

Mazatlan, Lower California, Southern California.

The irregularity of the last whorl, as shown in my figures, appears to be characteristic of the species.

4. PLANORBIS GRACILENTUS, *Gould*.

Plate 5, fig. 7, 8, 9.

Shell discoidal, compressed, finely striated; right side flattened; left side moderately concave; on each side four rounded whorls are visible; the last obtusely angular at the periphery; aperture quite oblique, wide, roundedly oval.

Diam. 12·5, alt. 3 mill.

No North American species of equal size can be compared with this well-marked, wheel-shaped species. Mr. Binney has confounded with it *Pl. Liebmanni*, of Dunker, which is very different and has not been found west of the dividing ridge of mountains which so clearly separate our mollusca into two faunas.

5. PLANORBIS HALDEMANI, *Dunker*.

Plate 5, fig. 10, 11.

Shell discoidal, depressed, rather solid, pale horn-colored, obsoletely striate, rather concave both above and below, almost flat, pitted in the middle of each side; whorls five, oval, rather involute; aperture ovate heart-shaped, somewhat dilated.

Diameter 12·5, alt. 4 mill.

Mexico, Lower California.

Mr. Binney has placed this species in *Planorbella*, but it surely belongs in the typical group along with *gracilentus*, for the slight and gradual increase of diameter of the whorl towards the aperture is common to many species of *Planorbis*, and certainly not the character assigned to *Planorbella* by Haldeman, "aperture campanulate or bell-shaped."

B. SPECIES INHABITING THE ATLANTIC STATES.

6. PLANORBIS LENTUS, *Say*.

Haldeman, Monog. p. 18, t. 3, figs. 4—6.

This is essentially a Southern species, and, assigned habitats in the North-western States, must be looked upon with some degree of suspicion.

7. PLANORBIS GLABRATUS, *Say*.

Hald., Monog. p. 11, t. 2, f. 1, 3.

Inhabits South Carolina, Georgia, Louisiana, Iowa; but nowhere common. It does *not* inhabit Oregon, as stated by Mr. Binney. The Oregon species referred to it is probably *Pl. subcrenatus*, Carpenter.

8. PLANORBIS TUMIDUS, *Pfeiffer*.

Plate 5, fig. 12, 13.

Shell opaque, pale horn-colored or smoky, densely and finely striated, umbilicated above, slightly concave below; whorls five, convex, subcarinated on each side, rapidly increasing, separated by a deep suture; aperture oblique, lunate-rounded, somewhat kidney-shaped.

Diameter 19, alt. 6 mill.

Texas (Mexico, Guatemala).

I have no authentic specimens of this shell to refer to, and can therefore only hazard a conjecture that the species is identical with *glabratus*.

9. PLANORBIS HAVANENSIS, *Pfeiffer*.

Plate 5, fig. 14, 15.

Pl. Liebmanni, Dunker.—Plate 5, f. 16, 17.

Shell discoidal, thin, pale horn-colored or yellow, very delicately and densely striate;

above and below planulate and having an umbilicus in the centre; whorls five, subrotund, moderately increasing, separated by a deep suture; aperture oblique, roundly lunate.

Diameter 8, alt. 2·6 mill.

Texas (Cuba; Vera Cruz, Mexico.)

I cannot detect any difference between *Pl. Havanensis* and *Pl. Liebmanni*, and therefore unite them.

Mr. Binney has considered *Pl. gracilentus*, Gould, a synonym of *Liebmanni*, but the latter is a higher and smaller species, inhabiting a different district.

Subgenus PLANORBELLA, *Hald.*

10. PLANORBIS CAMPANULATUS, *Say.*

Hald. Monog. p. 9, t. 1, figs. 7—11.

Subgenus A D U L A, *H. Adams.*

11. PLANORBIS MULTIVOLVIS, *Case.*

Plate 6, fig. 1, 2.

Whorls seven, about half the last whorl overlapping the preceding one, sometimes the last whorl suddenly distorted and expanded for the last half of its length; right side concave, left side slightly acuminate and carinate; throat campanulate; aperture opening towards the left, but projecting on both sides beyond the preceding whorl.

Diameter 15 mill.

Northern Michigan.

Subgenus HELISOMA, *Swainson*.

[A. SPECIES INHABITING THE PACIFIC STATES.

12. PLANORBIS AMMON, *Gould*.

Plate 6, figs. 3, 4, 5.

Pl. Traskii, Lea. Plate 6, fig. 6.

Shell large, discoidal, subconic, finely or coarsely striate; left side broadly and deeply concave, showing four obtusely carinated whorls; right side concave, showing two-and-a-half rounded whorls; aperture ovate-triangular, expanded on each side when fully grown.

Diam. 25, alt. 15 mill.

California, Oregon, Washington Territory.

The specimens at different stages of growth vary greatly in the development of the aperture; but all agree in the peculiar slope of the outer volution, giving them a conical or dome-shaped form when lying on the left side.

13. PLANORBIS BINNEYI, *Tryon*.

Hald. Monog. p. 19, pl. 3, figs. 7—9.

This is the *Planorbis corpulentus* of Halde-
man in part, but it is not the species published
under that name by Mr. Say, which I agree
with Mr. Binney in considering nothing but a
fully-developed form of *Pl. trivolvis*. Mr
Binney's figure 193, however, is a young *Pl.*
ammon.

Pl. Binneyi is abundant in various localities
in Washington Territory and Oregon.

14. PLANORBIS TENUIS, *Philippi*.

Plate 6, fig. 7, 8, 9.

Shell large, very thin, shining, very deli-
cately striate, pale horn or smoke-colored;
concave on each side, umbilicated above,
deeply excavated below; whorls swollen,
rounded, above narrow, subcarinated below
and rapidly increasing; aperture sinuous, sub-
auriculate.

Diam. 19, alt. 8 mill.

California to Mexico.

All the West Coast specimens, included by Mr. Binney in *Pl. trivolvis*, are referable to this species, which entirely replaces *trivolvis* west of the Rocky Mountains. It differs from *trivolvis* in its fragility, carina, etc.

15. PLANORBIS OREGONENSIS, Tryon.

Plate 6, fig. 10, 11, 12.

Shell very like *Pl. trivolvis*, but whorls more rapidly increasing in volume; aperture oblique, ear-shaped, large, extending above and below the plane of the volutions; texture thin, striæ not very close, coarse and irregular. Color dark horn.

Diam. 9, alt. 4 mill.

Pueblo Valley, near the boundary between Oregon and Nevada, 60 miles west of the east boundary of Oregon.—W. M. Gabb.

This interesting species is from a thermal spring, the water of which has a temperature

above blood-heat. In the same spring were some aquatic beetles (*Dytiscus*) and extensive growth of conferva, and swimming on the surface were two species of water birds.—W. M. Gabb.

Extra-limital.

A. PLANORBIS FRAGILIS, *Dunker.*

Plate 6, fig. 13, 14, 15.

Shell tumid, fragile, very delicately striate, pale horn or amber-colored; deeply umbilicate above, below rather concave; whorls four, involute, on each side rounded, rapidly increasing, the upper ones spirally striated and decussated, conspicuous below, aperture large, spreading, oblique, kidney-shaped; lip very acute, with a very delicate white callus on the parietal wall.

Diam. 12·5, alt. 6·5 mill.

Near City of Mexico.

I have never seen this species, which may hereafter be found in Southern California.

B. SPECIES INHABITING THE ATLANTIC AND
MIDDLE STATES.

16. PLANORBIS TRIVOLVIS, *Say*.

Plate 6, fig. 16.

Hald. Monog. p. 13, t. 2, f. 4—7.

P. trivolvis, var. *fallax*, Hald., p. 15, t. 3, figs. 1, 2, 3.

As previously remarked under *Pl. Binneyi*, Mr. Say's *Pl. corpulentus* is the same as the species now under consideration. In the waters of the Northern border States and in Canada, *Pl. trivolvis* sometimes attains a very large size and is furnished with a somewhat reflected lip. I have figured such a specimen (fig. 16), being a shell described by Mr. Whiteaves as *Pl. macrostomus*. Until recently I considered Mr. Lea's *Pl. regularis* distinct, but a close examination leads me to the conclusion that it is not entitled to specific rank apart from *trivolvis*.

Pl. proboscideus, Potiez, ascribed to North America, and included by Binney in the synonymy of this species, is, I think, of very doubtful position, and I incline to believe it is not North American.

17. PLANORBIS BICARINATUS, *Say*.

Hald. Monog. p. 6, t. 1, figs. 1—6.

Distributed throughout the entire country east of the Rocky Mountains, but commonest in the waters of the Eastern and Middle States.

Planorbis lautus, H. Adams, from New Orleans, has never been figured, nor have I seen an authentic specimen, but, judging from the description, I think it probable that it is the young of this species.

Planorbis antrosus, Conrad, I am also inclined to place in the synonymy of *bicarinatus*. It has not been figured, and, if different, has not been included in any of the numerous collections sent to us by zealous explorers like Dr. E. R. Showalter, who have so thoroughly examined the waters of Alabama for Mollusca. Mr. Conrad himself has no recollection of his species, which he described over thirty years ago.

18. PLANORBIS TRUNCATUS, *Miles*.

Plate 6, fig. 17, 18, 19.

Shell suborbicular, color light chestnut; the right side deeply umbilicated, the concavity bordered by an obtuse carina; the volutions, seen from this side, are scarcely more than two; left side truncated, presenting a flat surface extending across all the whorls, the suture being marked by an obtuse raised line, which likewise extends around the edge of the truncation; the space between the volutions of this raised line, as well as the entire body of the shell, is beautifully marked with delicate longitudinal lines, which are crossed by the minute, raised, transverse lines of growth; whorls on the left side four or five; aperture ovate, widest on the right side, which extends beyond the general plane of that side of the shell; the lip on the left side is straight for a short distance from the body whorl, and to a

line with the truncated plane, at the outer edge of which it forms an angle, marked on the inner surface by a slight groove, corresponding to the raised line separating the whorls on the outside; lip thin, slightly thickened by a bluish-white callus, bordered on the inner edge by a purplish band; the longitudinal lines, as well as the transverse lines of growth, are distinctly seen within the aperture.

In a few specimens the growth of the whorls has not been in the same plane, leaving a slightly projecting turreted spire on the left side.

Diam. 13, alt. 7 mill.

Saginaw Bay, Mich.

I have copied above the whole of Dr. Miles' elaborate description of this very curious species, which has not been found anywhere except at the original locality. It is not a locally distorted form of any other species, but perfectly distinct, in my estimation.

Subgenus M E N E T U S, *H. & A. Adams.*

19. PLANORBIS OPERCULARIS, *Gould.*

Plate 7, fig. 1, 2, 3.

Shell small, dextral, much depressed, lenticular, with a prominent blunted keel at the periphery defined by a marginal, compressed line; tip sunken; beneath umbilicated for about one-third the breadth of the base, showing three volutions, convex, surface rather rude and indented, marked with irregular, coarse, much arcuated lines of growth, and here and there a few obscure, raised, revolving lines; color dark chestnut-brown, a little clouded; whorls above four, slightly convex; suture well defined, impressed; aperture transversely subrhombic, lip above slightly declining, at periphery acute-angled, beneath arched,

lips embracing three-fourths of that part of the whorl which is beneath the carina.

Diam. 6, alt. 1·5 mill.

California.

Allied to *Pl. exacutus*, but is larger, less compressed and less delicate, and the periphery, instead of being sharp-edged, has a blunted keel, like *Pl. carinatus* of Europe.

It is a common species in the waters of California.

20. PLANORBIS EXACUTUS, *Say*.

Hald. Monog. p. 21, t. 4, figs. 1—3.

Inhabits all the Northern, Middle and Western States, but is replaced in California by the preceding species.

I agree with Mr. W. G. Binney in including *Paludina hyalina*, Lea, and *Planorbis lenticularis*, Lea, in the synonymy of this species, but *Planorbis Buchanensis*, also here included by Mr. Binney, is, I think, identical with *Pl. dilatatus*, Gould.

Subgenus NAUTILINA, *Stein.*21. PLANORBIS VERMICULARIS, *Gould.*

Plate 7, fig. 4—6.

Shell small, dome-shaped, minutely striated by growth, whorls four, the last one deflected near the aperture, rounded at periphery, tip depressed, suture very deep, the whorls sloping towards it; base cup-shaped, exhibiting all the whorls. Aperture exhibiting a very oblique section of a cylinder; lip embracing about one-half the height of the last whorl and joined by callus.

Diam. 5, alt. 1.6 mill.

Oregon and California.

It is about the size of *Pl. deflectus*, Say, but is less depressed, the whorls more cylindrical, not carinated at periphery.

This is the representative in the Pacific States of our common *Pl. deflectus*.

22. PLANORBIS DEFLECTUS, *Say*.

Hald. Monog. p. 25, t. 4, figs. 4—7.

Inhabits all the Northern and Middle States east of the Rocky Mountains.

23. PLANORBIS DILATATUS, *Gould*.

Hald. Monog. p. 23, t. 4, fig. 16—18.

I consider Mr. Lea's *Pl. Buchanensis* synonymous with this species, and not with *Pl. exacutus*, as it is considered by Mr. Binney.

The species appears, from our imperfect data, principally confined to the Eastern and Middle States, and does not appear to be anywhere abundant. Mr. Binney's figure of the base represents a wide umbilicus, and does not in the remotest degree resemble the figure of Gould's from which it is said to be copied.

24. P. CENTERVILLENSIS, *Tryon*.

Plate 7, fig. 7, 8, 9.

Shell small, of four rather elevated whorls, well rounded, slightly angled on the periphery, suture well impressed, umbilicus narrow and deep; aperture slightly dilated, quite oblique.

Diam. 4, alt. 1.5 mill.

Inhabits Centerville and other localities in California. This is the Californian representative of our *Pl. dilatatus*, from which it differs in its larger size and greater proportional height.

25. PLANORBIS ALBUS, *Müll.*

Hald. Monog. p. 29, t. 4, fig. 8—10.

Its southern distribution has been ascertained to extend as far as the District of Columbia.

26. PLANORBIS PARVUS, *Say*.

Hald. Monog. p. 27, t. 4, f. 19—23.

Planorbis Billingsii, Lea. Plate 7, fig. 10.

Mr. Lea's species is said by its author to differ from *parvus* in having a wider umbilicus, more oblique aperture, and exhibiting one more whorl; but in neither of these respects does it differ from the majority of fully grown specimens of *parvus*.

27. PLANORBIS ARCTICUS, *Beck*.

Plate 7, fig. 11, 12, 13.

Shell corneous or yellowish, widely umbilicate; whorls three and a half, canaliculately sutured, the last one obsoletely angulate at the periphery; aperture oblique.

Diam. 5, alt. 1.5 mill.

Greenland.

I have not seen this species, which is said by Mörch to resemble both *Pl. parvus* and *Pl. deflectus*.

28. *P. CIRCUMSTRIATUS*, Tryon.

Plate 7, fig. 14—16.

Shell small, rugose, generally distorted in adult specimens, (the whorls not proceeding in the same plane, but elevated or depressed from it at times); volutions four, convex, increasing very slowly in diameter, with deeply impressed suture, towards the aperture deflected; below concave, but exhibiting all the volutions, with two or three raised revolving lines; aperture small, very oblique. Light horn color.

Diameter 6 mill, height 1.5 mill.

Artificial pond at Weatogue, Connecticut.

The remarkable raised revolving lines are visible on the under surface of all the adults I have examined, but on the young shells there are no traces of them.

For the remarkable circumstances connected with the discovery of this species, reference is made to the description of *Limnea Shurtleffi* in this work.

Genus SEGMENTINA, *Fleming*.

1. SEGMENTINA ARMIGERA, *Say*.

Hald., Monog. p. 30, t. 4, f. 11—13.

2. SEGMENTINA WHEATLEYI, *Lea*.

Plate 7, fig. 17, 18, 19.

Shell small, dark horn-colored, flat, obsoletely striated, bicarinate, depressed above, broadly and deeply umbilicated below; whorls five, obtusely carinated above, below acutely so; aperture white, thick, strongly constricted; within are six teeth.

Alabama and Florida.

Extra-limital.

SEGMENTINA BERENDTII, *Tryon*.

(American Journal of Conchology, ii, 10, t. 2, f. 14—16.)

Inhabits Orizaba and Vera Cruz, Mexico.

Genus CARINIFEX, *Binney*.1. CARINIFEX NEWBERRYI, *Lea*.

Plate 7, figs. 20—24.

Shell light horn-color, turreted, very minutely striated, above and below acutely carinated, broadly and deeply umbilicated, whorls five, flat above, sloping convex below; aperture large, subtriangular.

California.

This curious shell varies in appearance considerably. In old specimens the carination is sometimes nearly obsolete, as in our figure 24. The animal has not yet been described.

PLANORBIS.

SYNONYMY AND REFERENCE TO
PLATE 5.

Fig.

- 1, 2. PLANORBIS SUBCRENATUS, Carpenter. London Zool. Proc. 220, 1856.
Binney, l. c. 103. No. 1.
- 3, 4. PL. HORNII, Tryon. Am. Jour. Conch. i, 231, t. 22, f. 16, 1865. No. 2.
- 5, 6. PL. TUMENS, Carpenter. Mazatlan, Cat. 181.
Binney, l. c. 106. No. 3.
- 7, 8, 9. PL. GRACILENTUS, Gould. Proc. Bost. Soc. v, 129, 1855. No. 4.

- 10, 11. PL. HALDEMANI, Dunker. Küster's
Chemnitz, 59, t. 10, f. 38—40.
Binney, l. c. 110. No. 5.
- 12, 13. PL. TUMIDUS, Pfeiffer. Wiegmann's
Archiv. 354, 1839.
Binney, l. c. 105.
Pl. caribæus, Orb. Moll. Cuba, 193, t.
13, f. 17—19.
Pl. intermedius, Phil. Conch. Cab. i,
t. 1, f. 18, 19. No. 8.
- 14, 15. PL. HAVANENSIS, Pfeiffer. Wieg-
mann's Archiv. 354, 1839.
Binney, l. c. 107.
Pl. Terverianus, Orb. Moll. Cuba, 194,
t. 13, f. 20—23.
- 16, 17. *Pl. Liebmanni*, Dunker. Küster's
Chemnitz, 59, t. 10, f. 32—34.
Binney, l. c. 108. No. 9.

PLANORBIS.

SYNONYMY AND REFERENCE TO
PLATE 6.

Fig.

- 1, 2. PL. MULTIVOLVIS, Case. Am. Jour. Science. 2d ser. iii, 101, f. 4, 5, 1847.
Binney, l. c. 111. No. 11.
- 3, 4, 5. PL. AMMON, Gould. Bost. Proc. v, 129, 1855.
6. *Pl. Traskii*, Lea. Proc. Philad. Acad. viii, 80, 1856.
Observ. xi, 113, t. 23, f. 70. No. 12.
- 7, 8, 9. PL. TENUIS, Philippi. Neuer Conch. i, f. 23—25.
Binney, l. c. 113. No. 14.

- 10, 11, 12. *PL. OREGONENSIS*, Tryon. Am.
Jour. Conch. i, 231, t. 22, f. 17,
1865. No. 15.
- 13, 14, 15. *PL. FRAGILIS*, Dunker. Küster's
Chemnitz, 46, t. 10, f. 41—43.
Binney, l. c. 122.
- *PL. TRIVOLVIS*, Say. Hald. Monog. 13, t.
2, f. 4—7.
16. *Pl. macrostomus*, Whiteaves. Canad.
Naturalist, viii, 113, 1863. No. 16.
- 17—19. *PL. TRUNCATUS*, Miles. Winchel's
Geol. Michigan, 238, 1861. No. 18.

PLANORBIS.

SYNONYMY AND REFERENCE TO
PLATE 7.

Fig.

- 1—3. PL. OPERCULARIS, Gould. Proc. Bost.
Soc. ii, 212, 1847.
Binney, l. c. 125. No. 19.
- 4—6. PL. VERMICULARIS, Gould. Proc. Bost.
Soc. ii, 212, 1847.
Binney, l. c. 128. No. 21.
- 7—9. PL. CENTERVILLENSIS, Tryon. This
work, p. 210. No. 24.
- PL. PARVUS, Say. Hald. Monog. p. 27,
t. 4, f. 19—23.
10. *Pl. Billingsii*, Lea. Philad. Proc. iii,
1864.
Observ. xi, 115, t. 23, f. 72. No. 26.

11—13. PL. ARCTICUS, Beck. Moller Moll.
Groenl. 5.

Am. Jour. Conch. iv, 32, t. 4, f. 9,
1868. No. 27.

14—16. PL. CIRCUMSTRIATUS, Tryon. Am.
Jour. Conch. ii, 113, t. 10, f. 68,
1866. No. 28.

SEGMENTINA.

17—19. S. WHEATLEYI, Lea. Philad. Proc.
41, 1858.

Observ. xi, 114, t. 23, f. 71. No. 2.

CARINIFEX.

20—24. C. NEWBERRYI, Lea. Philad. Proc.
41, 1858.

Megasystropha Newberryi, Lea. Observ.
xi, t. 23, f. 68. No. 1.

Subfamily *ANCYLINÆ*.Genus *ANCYLUS*, *Geoffroy*.

The number of known species has been nearly doubled since the publication of Prof. Haldeman's Monograph, the additions being principally from the States of Oregon and California. The shells are generally small, and not readily detected.

A. SPECIES OCCURRING IN THE STATES EAST OF
THE ROCKY MOUNTAINS.

1. *ANCYLUS OBSCURUS*, *Haldeman*.

Haldeman, Monog. p. 5, t. 1, fig. 5.

I have heard of no other locality than the original one. That the species occurring in the West India islands is the same as this I think doubtful, although Adams and Shuttleworth believe it to be the same.

2. ANCYLUS FUSCUS, *Adams*.

Hald. Monog. p. 12, t. 1, f. 7.

Massachusetts, District of Columbia, Ohio.

3. ANCYLUS ELATIOR, *Anthony*.

Plate 2, fig. 1, 2.

Shell very much elevated, ovate; lines of growth distant, conspicuous; color light green, opaque; apex decorticated, recurved, subcentral; anterior and posterior slopes convex; lateral slopes plane; apical region rose-colored.

Length 6·5, width 5, alt. 3·5 mill.

Green River, Kentucky.

This is rather a heavy, robust species, and one not easily confounded with any other; it most nearly resembles, perhaps, *Ancylus crassus*, Hald., but differs from it in being more elevated, in having the lines of growth coarser, and by its rosy apex. It is more elevated than any other species of the genus with which I am acquainted.

4. ANCYLUS DIAPHANUS, *Hald.*

Hald. Monog. p. 8, t. 1, fig. 4.

Ohio and Wisconsin.

5. ANCYLUS HALDEMANI, *Bourguignat.*

Zool. Proc. London, 83, 1853.

A. depressus (preoccupied), Hald. Monog. p. 6, t. 1, f. 12.

It has not been detected elsewhere than the original locality.

6. ANCYLUS PARALLELUS, *Hald.*

Hald. Monog. p. 11, t. 1, fig. 6.

This species has only been detected in the New England States. Prof. Haldeman has erred, I think, in considering the *A. rivularis* of Gould's "Invertebrata of Massachusetts" to be the same species, as I can only consider the description and figure to refer decisively to the *rivularis*.

7. ANCYLUS RIVULARIS, *Say*.

Hald. Monog. p. 4, t. 1, fig. 1.

Extensively distributed through the Northern, Middle and Western States.

8. ANCYLUS TARDUS, *Say*.

Hald. Monog. p. 7, t. 1, f. 3.

Maine, Vermont, New York, District of Columbia, Indiana.

9. ANCYLUS CALCARIUS, *DeKay*.

Plate 2, fig. 3, 4.

Shell conic, calcareous, opaque. Apex not central, moderately prominent; aperture oval, entire; the curves on the longest sides dissimilar. In very minute specimens, the edges somewhat everted. Epidermis rufous, extend-

ing beyond the edge of the aperture; within bluish-white, darker towards the apex.

Length 7·5, alt. 3 mill.

Passaic River, near Patterson, N. Jersey.

“The specimen which furnished the above description was one of the largest which I have seen. They are more commonly of the dimensions of *A. rivularis*. I separate it from the latter chiefly on account of its solid, calcareous structure.” I have not seen this species, and can offer no opinion upon it.

10. ANCYLUS BOREALIS, *Morse*.

Plate 2, fig. 7, 8.

Shell elliptical, solid, light yellow, apex elevated, rounded, very obtuse, nearer the posterior margin of the shell; lateral slopes steep, anterior slope slightly convex, near the apex; posterior slope straight. Fine regularly interrupted radiating lines mark the surface of the shell from the apex to the borders; incremental lines irregular.

Length 3·5, width 2·2, alt. 1·5 mill.

Northern Maine.

This species resembles *A. tardus* in its general form. It is much smaller, however, and has a strong, heavy shell.

B. SPECIES INHABITING THE PACIFIC STATES.

11. ANCYLUS NEWBERRYI, *Lea.*

Plate 2, fig. 9, 10.

Shell large, obtusely pyramidal, dark, reddish-brown, slightly compressed at the sides; apex subcentral, aperture elliptical.

Length 13·8, width 10, alt. 5 mill.

Klamath Lake, Pitt River, &c., California.

This is the largest American species—a giant for the genus.

12. ANCYLUS KOOTANIENSIS, *Baird*.

Plate 2, fig. 11, 12.

Shell ovate, ashy, concentrically striate, vortex anterior, obtuse, shining within.

Length 9, width 6 mill.

Kootanie and Spokane Rivers, British Columbia.

I have not seen this species. Its ovate, more depressed form appears to distinguish it from *Newberryi*.

13. ANCYLUS CRASSUS, *Hald*.

Hald. Monog. p. 14, t. 1, f. 8.

14. ANCYLUS ALTUS, *Tryon*.

Plate 2, fig. 13, 14.

Shell somewhat oblong, broadly rounded at one end, more narrowly so at the other; con-

vexly much elevated, apex obtuse, subcentral, texture delicate, surface rather smooth.

Length 8, width 6, alt. 4 mill.

Klamath River.

This shell is larger, narrower, more elevated, and not so solid as Prof. Haldeman's *A. crassus*, and it does not approach in outline to either of Mr. Lea's new West Coast species, both of them being more narrowly elongate. It is one of our largest species.

15. ANCYLUS SUBROTUNDATUS, *Tryon*.

Plate 2, fig. 15, 16.

Shell large, very fragile, oval, nearly round; convex, but little elevated; apex obtuse, nearly central.

Length 8, width 6·5, alt. 3 mill.

Umpqua River, Oregon.

16. ANCYLUS FRAGILIS, *Tryon.*

Plate 2, fig. 17, 18.

Shell very small and fragile, sides nearly parallel or slightly incurved in the middle, but diverging anteriorly; ends rounded. Apex elevated, acute, curved backwards, with about two-thirds of the shell anterior to it.

Length 4, width 1.5, alt. 1 mill.

California.

This species is smaller, thinner, and wants the convex lateral margins of *Anc. rivularis*. It agrees with that shell, however, in the greater width of its anterior end, while in the shape of the lateral margins it resembles *A. parallelus*, Hald. It is much the smallest of our species, most specimens being only two-thirds the dimensions given above.

Ancylus caurinus, Cooper, mentioned by name only, neither described nor figured, is a synonym of this species—*vide* the figure from a type specimen in Mr. Binney's work, f. 243, p. 144.

*Spurious Species.*ANCYLUS PATELLOIDES, *Lea.*

This shell, described and figured by Dr. Lea in "Observations," etc. vol. xi, and said to be from Sacramento River, is so evidently a marine species belonging to *Patellidæ* or its allies, that I have not deemed it necessary to include the description in my monograph.

ANCYLUS DROUETIANUS, *Bourguignat.*

This is certainly not a North American species, judging from description and figure.

Genus ACROLOXUS, *Beck.*

*A. Eastern Species.*1. ACROLOXUS OVALIS, *Morse.*

Plate 2, figs. 5, 6.

Shell very small, depressed, irregularly ovate, apex nearly central, round, smooth and blunt, slightly inclined to the left; slopes irregular, caused by different periods of repose and growth; posterior slope in most specimens straight, anterior slope convex, lateral slopes steep; shell widening anteriorly; lines of accretion extremely fine, visible within but requiring a magnifier to discern them without, being greatly obscured by fine grains of sand agglutinated to the surface. Periostraca pale yellow; the surface, when magnified, exhibits about forty-five delicate ribs, which radiate from the apex to the periphery of the shell.

Length 3, width 2·5, alt. 1·5 mill.

Androscoggin River, Maine.

2. ACROLOXUS FILOSUS, *Conrad*.

Hald. Monog. p. 10, t. 1, fig. 9.

*B. Species of the Pacific States.*3. ACROLOXUS NUTTALLII, *Hald*.

Shell fuscous, oval, elevated, apex one-fourth of the entire length from one end.

Length 8, width 6.25, alt. 3 mill.

Oregon.

This species was described by Prof. Haldeman on the cover of Part 3 of his Monograph, but not figured. I can give no information concerning the species, which I have not seen.

Genus GUNDLACHIA, *Pfeiffer*.1. GUNDLACHIA CALIFORNICA, *Rowell*.

Plate 2, figs. 19—21.

Shell with the aperture suboval, obliquely expanded towards the left, posteriorly rounded and wider anteriorly. Internal shelf reaching forward about one-fifth the length of the shell, its margin slightly concave and oblique. Dorsal surface convex, becoming somewhat keel-shaped towards the apex, which is strongly and obliquely deflected so as to make the right border nearly a straight line, while the expansion on the left projects nearly as far back as the apex at an obtuse angle. Structure corneous, with strong concentric lines of growth and faint radiating striæ. Color dark brown, opaque; inner surface

(27)

shining and purplish, the plate white towards the edge, and in some specimens showing a thickened, white semicircle continuous with its margin across the arch of the shell.

Length 4, width 2, alt. 1.5 mill.

California.

2. GUNDLACHIA MEEKIANA, *Stimpson*.

Plate 2, figs. 22—24.

Full grown shell in general form ovate, aperture less ovate than in *G. Californica*. Dorsal part black, opaque, thick, apex very obtuse and inclined to the right. Lower part of the shell thin, translucent, whitish or very pale horn-color; more expanded to the left than to the right, the dorsum and left slope being strongly convex, while the right slope is nearly straight.

District of Columbia.

Mr. Stimpson ventures to suggest that the *Gundlachia* commences its life as an *Ancylus*, the dorsal opaque part of the shell, in which

the earlier part of its life is spent, being undistinguishable in form from the shells of that genus. It is probable that it passes the first summer and autumn of its existence in this smaller shell, and that the septum, which afterwards partially closes its aperture, is formed during the period of inaction which ensues during the winter. The septum would in some degree serve as a protection to the mollusk during this period, in the same way as the epiphragm of the *Helices*. In the following spring the additional growth of shell commences, but in the winter it would probably present the appearance of an *Ancylus* with two-thirds of its aperture closed by a septum, leaving but a small opening for the egress of the foot of the animal.

ANCYLUS.

SYNONYMY, AND REFERENCE TO

P L A T E 2.

Fig.

1, 2. *ANCYLUS ELATIOR*, Anthony. *Annals N. York Lyceum*, vi, 158, t. 5, f. 20—21, 1855.

Binney, l. c. 140. No. 3.

3, 4. *A. CALCARIUS*, DeKay. *Moll. N. York*, 13, t. 5, f. 99, 1843.

Binney, l. c. 144. No. 9.

 ACROLOXUS.

5, 6. *A. OVALIS*, Morse. *Portland Jour.* i, 44, 1864.

Binney, l. c. 156. No. 1.

ANCYLUS.

7, 8. A. BOREALIS, Morse. Portland Jour. i,
45, 1864.

Binney, l. c. 156. No. 10.

9, 10. A. NEWBERRYI, Lea. Proc. Acad.
Philad. 166, 1858.

Observ. xi, 141, t. 24, f. 116.

Binney, l. c. 145. No. 11.

11, 12. A. KOOTANIENSIS, Baird. Proc. Lond.
Zool. Soc. 69, 1863.

Binney, l. c. 144. No. 12.

13, 14. A. ALTUS, Tryon. Am. Jour. Conch.
i, 230, t. 22, f. 15, 1865. No. 14.

15, 16. A. SUBROTUNDATUS. Tryon. Am.
Jour. Conch. i, 230, t. 22, f. 14,
1865. No. 15.

17, 18. A. FRAGILIS, Tryon. Proc. Philad.
Acad. 149, t. 1, f. 15, 1863.

Binney, l. c. 146. No. 16.

GUNDLACHIA.

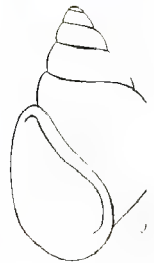
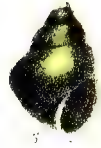
Fig.

19—21. G. CALIFORNICA, Rowell. Proc. Cal.
Acad. iii, 21, 1863.

Binney, l. c. 149. No. 1.

22—24. G. MEEKIANA, Stimpson. Proc. Bost.
Soc. 249, 1863.

Binney, l. c. 150. No. 2.



1. *P. OLIVACEA* (L.) 2. *P. LUCIDA* (L.)
 3. *P. GIBBOSA* (L.) 4. *P. VITRELLA* (L.)
 5. *P. PAVONA* (L.)



1 <i>P. SUBCARINATA</i> , Say	5 <i>P. MILESII</i> , Lea
2 <i>P. WALTONI</i> , Tryon	6 <i>P. OBESA</i> , Lewis
3 <i>P. TEXANA</i> , Tryon	7 <i>P. EXILIS</i> , Auth
4 <i>P. ELLIOTTI</i> , Lea	8 <i>P. LIMA</i> , Auth



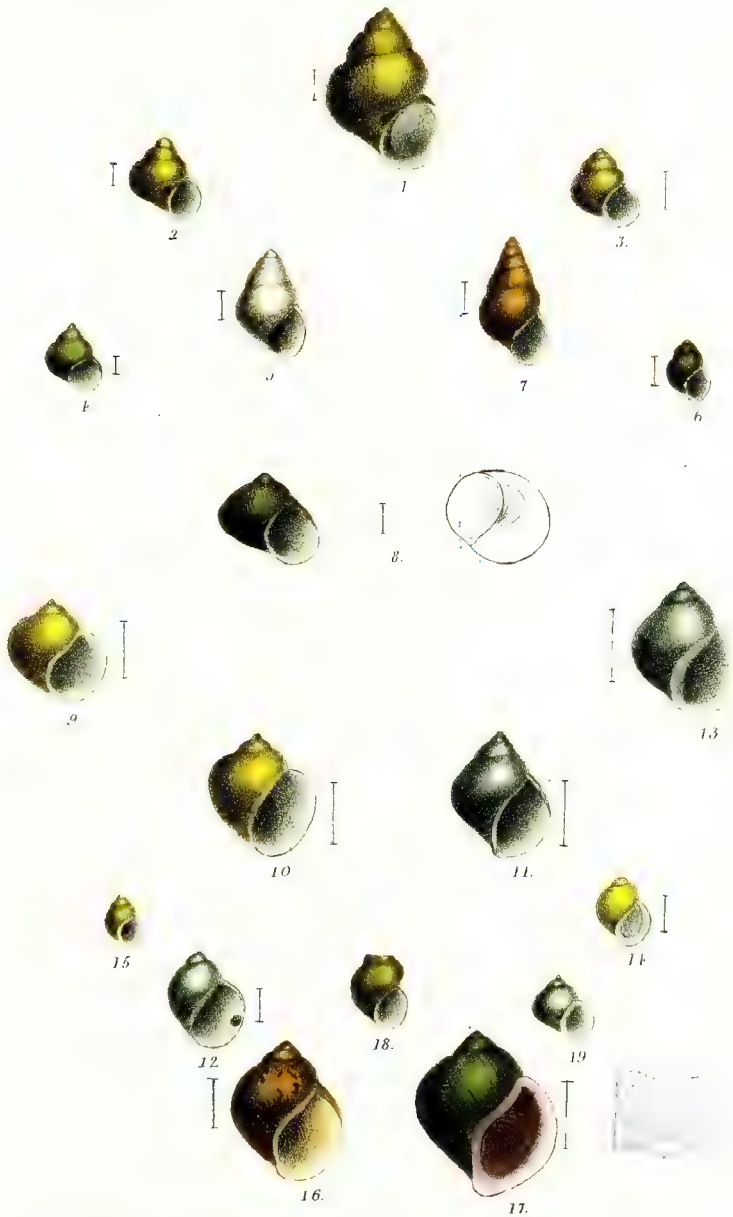
1 *P. DE CAMPII* Carrier 2 *P. INORNATA*, Emnev
 3 *P. PONDEROSA*, Say 5 *P. R. WAREANA*, Slutt
 6 *P. DEUAPITATA*, Anth 7 *P. SPILLMANII* Lea



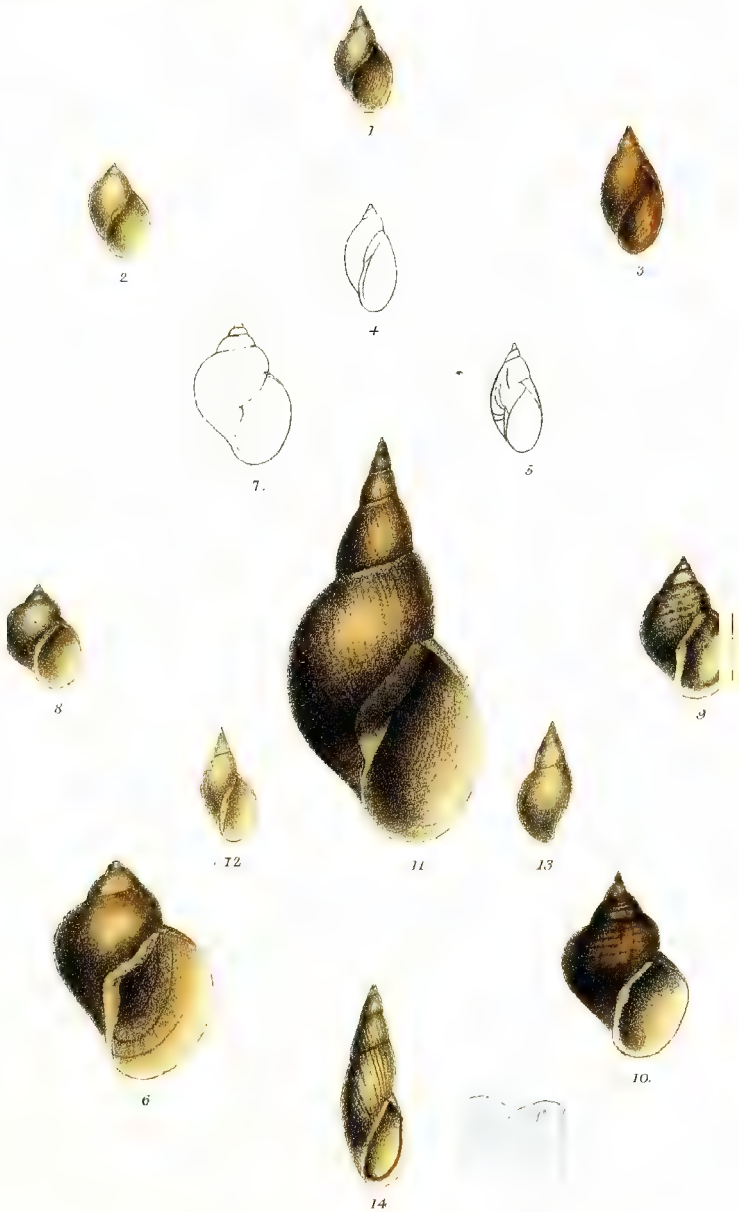
1	<i>P. COARCTATA</i> .	Lea	2	<i>P. COOSAENSIS</i> .	Lea
3	<i>P. TROOSTIANA</i> .	Lea	4	<i>P. CYCLOSTOMATIFORMIS</i> .	Lea
5	<i>P. HALEIANA</i> .	Lea	6	<i>P. REGULARIS</i> .	Lea
7	<i>P. INCRASSATA</i> .	Lea	8	<i>P. SPILLMANII</i> .	Lea



1. AMPULLARIA FLAGELLATA, Say. 5. BITHINELLA FLORIDANA, Fraueuf.
 2. NERITELLA SHOWALTERII, Lea. 6. B. OBTUSA, I
 3. VALVATA HUMERALIS, Say. 7. B. INTERMEDIA, "
 4. V. VIRENS, Tryon. 8. B. BINNEYI, "
 9. B. SEEMANI, Fraueuf.



- | | | | |
|---|--|----|--------------------------------------|
| 1 | <i>AMNICOLA SCHROCKINGERI</i> , Frenst. f. | 10 | <i>S. SUBGLOBOSUS</i> , Say. |
| 2 | <i>A. PARVA</i> , Lea | 11 | <i>S. ISOGONUS</i> , Say |
| 3 | <i>A. ORBICULATA</i> , Lea. | 12 | <i>S. DEPRESSUS</i> , Tryon |
| 4 | <i>A. GRANA</i> , Say. | 13 | <i>S. CURRIERIANUS</i> Lea. |
| 5 | <i>A. LONGINQUA</i> , Gld | 14 | <i>S. AUREUS</i> , Tryon |
| 6 | <i>A. TURBINIFORMIS</i> , Tryon. | 15 | <i>S. PARVUL</i> , Tryon |
| 7 | <i>POMATOPSIS LUSTRICA</i> , Say | 16 | <i>S. INTEGE</i> , ... |
| 8 | <i>COCHLIOPA ROWELLII</i> , Tryon. | 17 | <i>FLUMINICOLA NOTAGLIANA</i> , Lea. |
| 9 | <i>SOMATOGYRUS AETILIS</i> , Lea | 18 | <i>F. VIRENS</i> |
| | | 19 | <i>F. FUSCA</i> , Uald. |



1. <i>L. COLUMELLA</i> , Say.	9 <i>L. BINNEYI</i> ,	Teyon.
2. <i>L. MACROSTOMA</i> , Say.	10 <i>L. SUMASSI</i> ,	Baird.
3. <i>L. CASTA</i> , Lea.	11 <i>L. STAGN.</i>	Usen.
4. <i>L. STRIGOSA</i> , Lea.	12, 13 <i>L. LEPIDA</i>	Usen.
5. <i>L. COARETATA</i> , Lea.	14. <i>L. ZEBRA</i>	Teyon.
6, 8 <i>L. AMPLA</i> ,		Mighels.



1.



2.



4.



13.



5.



6.



7.



8.



9.



10.



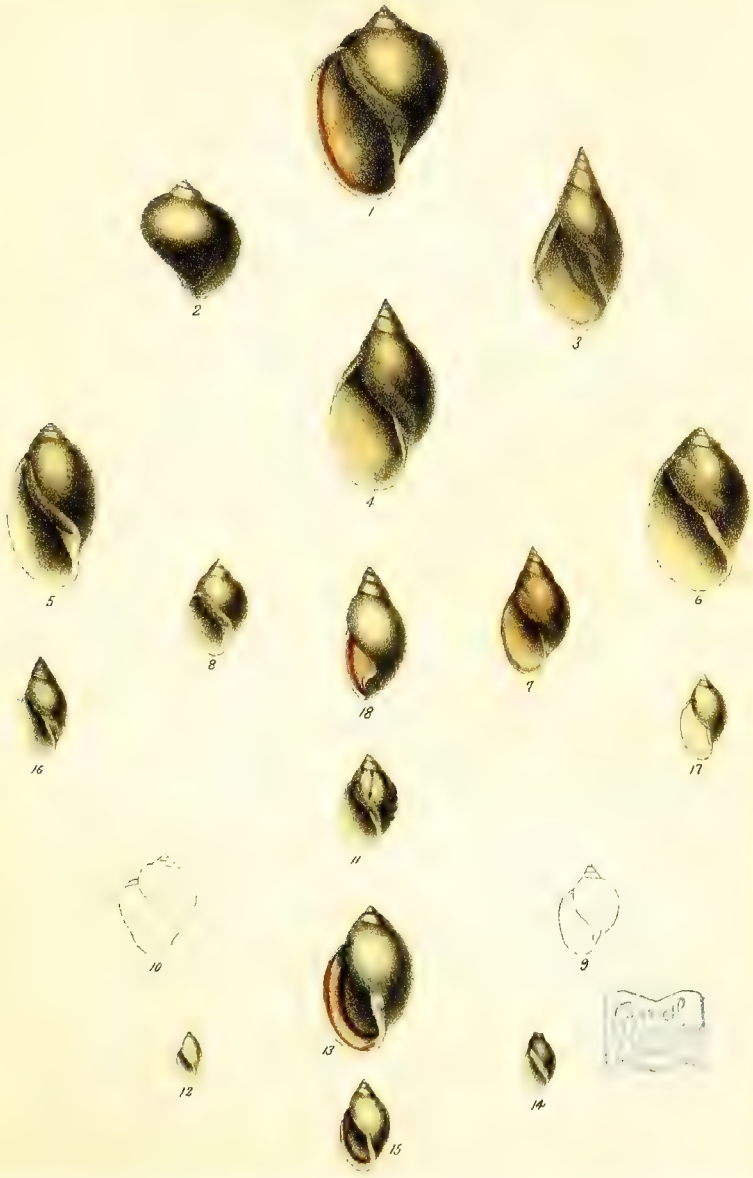
11.

1. *L. ROWELLII*. Tryon.
 2. *L. PROXIMA*. Lea.
 3. *L. TRASKII*. Tryon.
 4. *L. PALUSTRIS*. Müll.
 5. *L. SUMASSI*. Baird.

6. *L. HAYDENI*. Lea.
 7. 8. *L. SHURTLEFFII*. Tryon.
 9. *L. ARCTICA*. Lea.
 10. *L. VAHLII*.
 11. *L. HOLBOLLETII*.



- | | | | |
|---|--|---|--|
| 1. <i>L. TRASKII</i> ,
2. <i>L. SMITHSONIANA</i> ,
3. <i>L. JAMESII</i> ,
4. <i>L. LECONTII</i> ,
5. <i>L. GRIFFITHIANA</i> ,
6. <i>L. ADELINÆ</i> , | Lea.
Lea.
Lea.
Lea.
Lea.
Tryon. | 7. <i>L. GABRII</i> ,
8. <i>L. BROWNII</i> ,
9. <i>L. TEBELLA</i> ,
10. <i>L. KIRTLANDIANA</i> ,
11. <i>L. LANCEATA</i> ,
12. 14. <i>POMPHOLYX</i> | Tryon.
Tryon.
Hald.
Lea.
Gould
Lea. |
|---|--|---|--|



1-2.	<i>PHYSA LORDI</i> ,	Baird.	12.	<i>PHYSA TRITICEA</i> ,	Lea
3-4.	" <i>GABBL</i> ,	Tryon.	13.	" <i>PROPLINQA</i> ,	Tryon.
5-6.	" <i>AMPULLACEA</i> ,	Gould.	14.	" <i>COOPERI</i> ,	
7.	" <i>VIRGINEA</i> ,	Gould.	15.	" <i>DIAPHANA</i> ,	
8,10.	" <i>HUMEROSA</i> ,	Gould.	16.	" <i>DISTINGUEN</i> ,	
11.	" <i>VIRGATA</i> ,	Gould.	17.	" <i>POLYSSIM</i> ,	
	18.	<i>PHYSA OCCIDENTALIS</i>		Tryon.	

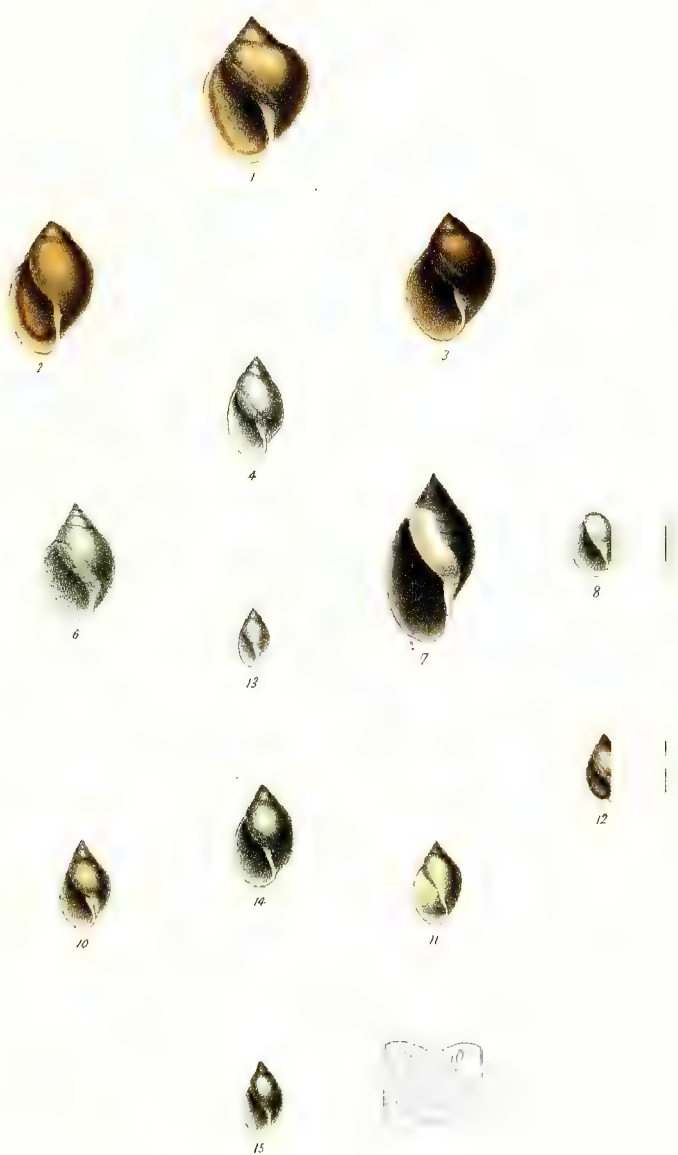


- 1 P. CONIFORMIS
- 2 P. NUTTALLII,
- 3 P. BLANDI,
- 4. P. TRASKII,
- 5 P. VENUSTA,
- 6 P. MALLEATA,
- 7 P. SPARSESTRIATA,

Tryon
Lea
Lea
Lea
Lea
Tryon
Tryon

- 10 11 P. COSTATA
- 12 P. MEXICANA,
- 13 B. AURANTIUS
- 14 B. ELATUS,
- 15 B. NITENS,
- 16 B. TENUISSIMA
- 17 B. BERLANDIERIANU
- 18 P. TRYONI

Newcomb
Kuster



- | | | | | | |
|---|------------------------|-------|----|-----------------------|-------|
| 1 | <i>P. ANCILLARIA.</i> | Say | 9 | <i>P. POMILIA.</i> | Cott |
| 2 | <i>P. WARRENIANA.</i> | Lea | 10 | <i>P. SHOWALTERII</i> | Lea |
| 3 | <i>P. VINOSA.</i> | Gld | 11 | <i>P. LATA</i> | Tryon |
| 4 | <i>P. INFLATA.</i> | Lea. | 12 | <i>P. PRIMEANA.</i> | |
| 5 | <i>P. NIAGARENSIS.</i> | Lea | 13 | <i>P. GROSVENORII</i> | |
| 6 | <i>P. SOLIDA.</i> | Phil | 14 | <i>P. HALPEI.</i> | |
| 7 | <i>P. PPLICATA.</i> | DeKay | 15 | <i>P. WHITEI.</i> | |
| 8 | <i>P. BREVI SPIRA.</i> | Lea | | | |



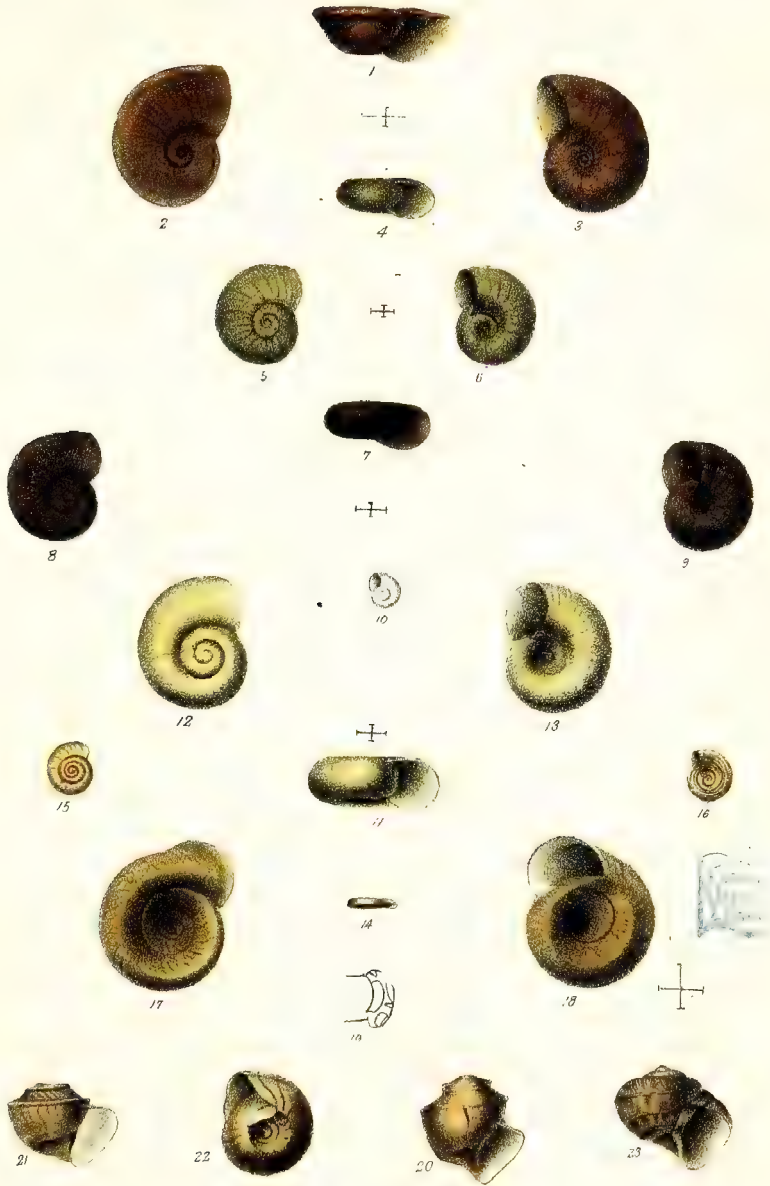
- | | | | |
|-----------------------------|------|------------------------------|-------|
| 1. <i>P. CROCATA</i> , | Lea | 10. <i>P. AUREA</i> , | Lea |
| 2. <i>P. FORSHUEYI</i> , | Lea | 11. <i>P. TROOSTIANA</i> , | Lea |
| 3. <i>P. ANATINA</i> , | Lea. | 12. <i>P. OLEACEA</i> , | Tryon |
| 4. <i>P. CYLINDRICA</i> , | Lea | 13. <i>P. FEBIGERI</i> , | Lea |
| 5. <i>P. HILDRETHIANA</i> , | Lea. | 14. <i>P. VICKLINII</i> , | J |
| 6. <i>P. HAWMII</i> , | Lea. | 15. <i>P. ALFOXENSIS</i> , | I. |
| 7. <i>P. SAFFORDI</i> , | Lea. | 16. <i>P. SMITHSONIANI</i> , | J. .. |
| 8. <i>P. PARVA</i> , | Lea. | 17. <i>P. DEFORMIS</i> , | C |
| 9. <i>P. ELLIPTICA</i> , | Lea. | 18. <i>P. GLABRA</i> , | DeKay |



1. 2	PL. <i>SUBCRENATUS</i> ,	Cpr.	10. 11	"	<i>HALDEMANNI</i>	Dunker
3. 4	" <i>HORNII</i> ,	Troyan.	12. 13	"	<i>TUMIDU</i>	Pfr.
5. 6	" <i>TUMENS</i> ,	Cpr.	14. 15	"	<i>ILAVANE</i>	Pfr.
7. 8. 9.	" <i>GRACILENTUS</i> .	Gld.	16. 17.	"	<i>LIEBMA</i>	Dunk



1.2.	Pl.	<i>MULTIVOLVIS</i> .	Case.	10112.	<i>OREGONENSIS</i> ,	Tryon
3.4.5	"	<i>AMMON</i> .	Goold	13.14.15	"	<i>FRAGILE</i>
6.	"	<i>TRASKII</i> .	Lea.	16.	"	<i>TRIVOLV</i>
7.8.9.	"	<i>TENUIS</i> .	Kuster.	17.18.19.	"	<i>TRUNC.</i>



1 3. *PL. OPERCULARIS*, Gould.
 4 6. " *VERMICULARIS*, Gould.
 7 9. " *CENTERVILLENSIS*, Tryon.
 10 " *BELLINGSHI*, Lea.

11-13. *PL. ARCTICUS*, Beck.
 14-16. " *CIRCUMSTRIPATUS*, Tryon.
 17 19. *S. WHEAT*, Lea.
 20-24. *C. NEWBI*, Lea.



1, 2 *A. ELIATOR*,
 3, 4 " *CALCARIUS*,
 5, 6 " *OVALIS*,
 7, 8 " *BOREALIS*,
 9, 10 " *NEWBERRYI*,
 11, 12 " *KOOTANIENSIS*,

Ant. v.
 De Kay
 Morse
 Morse
 Lea
 Baird

13, 14 *A. ALTUS*,
 15, 16 " *SUBROTUNDATUS*,
 17, 18 " *FRAG*,
 19, 21 *G. CALIF*,
 22, 24 " *MERR*

Tryon
 Tryon
 Rowell
 Stimpson

NUMBER *1. 2. Cold*

A

MONOGRAPH

OF THE

FRESH-WATER UNIVALVE MOLLUSCA

OF THE

UNITED STATES.

(IN CONTINUATION OF PROF. S. S. HALDEMAN'S WORK, PUBLISHED
UNDER THE ABOVE TITLE.)

BY GEORGE W. TRYON, JR.

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PHYSADÆ.

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