SMITHSONIAN MISCELLANEOUS COLLECTIONS.
143

LAND AND FRESH WATER SHELLS

OF

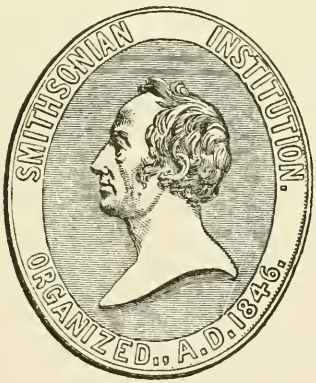
NORTH AMERICA.

PART II.

PULMONATA LIMNOPHILA AND THALASSOPHILA.

BY

W. G. BINNEY.



WASHINGTON:
SMITHSONIAN INSTITUTION.
SEPTEMBER, 1865.

PREFACE.

The *Pulmonata* are usually divided into *Geophila, Limnophila,* and *Thalassophila,* according as their habits are terrestrial, fluviatile, or marine. The first division is included in the Land and Fresh-Water Shells, Part I, now ready for the press. The second and third divisions form the subject of the present volume.

The descriptions of the family *Auriculidæ* have already been published in the fourth volume of The Terrestrial Mollusks of the United States. In the other families I have adopted the plan of giving the original description, or an English translation of it, and a fac-simile of the original figure not only of each species, but also of all those I have considered synonyms. I have thus placed within the reach of every American student all the materials for a complete monograph of the *Lymnæidæ*, &c., of North America which can be obtained from books. The other, more important, source of knowledge of the subject can be gained only by gathering together from every part of the country large suites of specimens, fairly representing each species. Not until this is done can their characters be described, and information given of their variation, their geographical distribution, and their relations to each other.

Though not competent to prepare a monograph all whose decisions may be considered final, it has been easy in numerous cases to refer supposed new species to those previously described. These instances arise from ignorance on the part of one author of the labors of those preceding him, or in his exaggeration of variations which to me have appeared too slight to denote specific difference. The repetition of the original description and figure of each of these synonyms will enable the student to judge for himself of the correctness of my decisions.

The Museum Register printed after the description of each species will show how large a collection of specimens I have had

before me belonging to the Smithsonian Institution. In addition to these I have had the opportunity of studying all the original specimens of Mr. Say, Prof. Haldeman, Dr. Gould, Mr. Lea, the Academy of Sciences of Philadelphia, the Museum of Comparative Zoology at Cambridge. I have received also typical specimens from almost all those who have described species, and corresponded so generally on the subject, that were I to specify those to whom I am indebted for information, the list would contain the name of nearly every living American conchologist.

The descriptions of orders, families, genera, and subgenera are principally copied from "The Genera of Recent Mollusca."

The subject is brought down to January, 1864.

All the original figures of shells and lingual dentition were drawn by Mr. E. S. Morse, of Gorham, Maine.

W. G. BINNEY.

Burlington, N. J., August, 1865

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LAND AND FRESH-WATER SHELLS

OF

NORTH AMERICA.

II.

PULMONATA.

Suborder LIMNOPHILA.

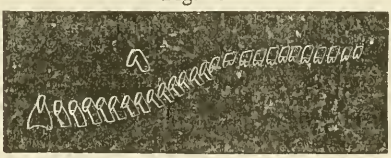
Eyes sessile; tentacles subcylindrical or flattened, simply contractile. Operculum wanting. Animal usually lacustrine or fluviatile, sometimes marine or littoral, rarely terrestrial.

All the known families of *Limnophila* are represented in this country. Their habits are described under each.

Family AURICULIDÆ.

Lingual membrane broad and elongated; teeth numerous, in slightly bent, cross series; central tooth equilateral; lateral

Fig. 1.



Lingual dentition of *Alexia myosotis*.

teeth rather inequilateral, diminishing in size towards the outer edge. Head ending in a snout; mouth with a horny lunate upper jaw,[1] and with two dilated buccal lobes, united

[1] See *Alexia myosotis*, p. 4.

above, separated below; tentacles subcylindrical, contractile; eyes sessile at the inner sides of the bases. Mantle closed, with a thickened margin; foot long, posteriorly blunt; respiratory orifice posterior, on the right side, excretory orifice near it. Sexes united, orifices of generative organs distant, on the right side.

Shell spiral, covered with a horny epidermis; aperture elongate, with strong folds on the inner lip; outer lip often dentate.

Animal usually frequenting salt marshes.

The *Auriculidæ* are easily distinguished from the other inoperculated air-breathing Mollusks. They are furnished with but one pair of non-retractile tentacles, on the inner base of which are situated the sessile eyes. The head is extended beyond the tentacles into an obtuse, rounded, bilobed snout. The mantle is thin, thickened on its margin. The foot is elongated and pointed. The sexes are united in each individual.

The shell is spiral, extremely variable, and in the American species conic, generally with a flattened spire, and furnished with numerous tooth-like laminæ, which contract the narrow aperture. The internal septa are usually removed.

The *Auriculidæ* are amphibious Mollusks, breathing free air, but apparently dependent for existence on a great deal of moisture, if not on the actual vicinity of the sea. Some species pass their whole life under circumstances which seem to preclude the possibility of their respiring air. Thus *Alexia myosotis* is often found on isolated stones in salt marshes, which are entirely covered by the tide four hours out of twelve. This species, when immersed in fresh water, becomes benumbed and soon dies.

Carychium exiguum, on the other hand, though found under similar circumstances, does not depend on the proximity to salt water, being widely distributed far beyond its influence over the interior of the country. *Blauneria pellucida*, also, has been detected living far from any water in a garden in the District of Columbia, whither it was introduced on plants from Charleston, S. C. With the exception of the two last mentioned, the American species are found on salt marshes and in brackish water near the sea.

Of the geographical distribution of our species but little is yet known. *Melampus bidentatus* is found from Maine to Texas.

Melampus obliquus is referred by Say to South Carolina. *Alexia myosotis* was probably introduced from Europe; I have never known of its being found south of New York harbor. *Carychium exiguum* will probably be found in all the States. The other species are confined to the coast of Florida and the Gulf of Mexico, some of them being common to Cuba and other West Indian Islands.

There are several genera of *Auriculidæ* not represented in this country, some attaining a large size, and with more brilliant coloring than our plain species, such as *Pythia, Cassidula, Auricula,* &c. They are widely distributed over the globe, reaching the greatest perfection in the Pacific Islands.

The family has been subdivided into *Auriculinæ* and *Melampinæ,* characterized by the comparative thickening or expansion of the outer lip.

Subfamily AURICULINÆ.

Animal terrestrial, living chiefly on the land. Tentacles developed. Shell with the inner lip plicate; outer lip thickened or expanded.

AURICULA, Lamarck.

No species of this genus, as now restricted, is found in the United States. The following list contains all the species described as *Auriculæ,* and the position in which they are now classed.

Spurious Species.

Auricula bidentata, Gld. &c., is the same as *Melampus.*
Auricula biplicata, Desh., is the same as *Melampus bidentatus.*
Auricula cingulata, Pf. &c., is the same as *Tralia.*
Auricula cornea, Desh., is the same as *Melampus bidentatus.*
Auricula denticulata, Gld., DeK., is the same as *Alexia myosotis.*
Auricula floridana, Shuttl., is the same as *Tralia.*
Auricula jaumei, Mittre, is the same as *Melampus bidentatus.*
Auricula obliqua, DeK., is the same as *Melampus obliquus.*
Auricula sayii, Küster, is the same as *Leuconia sayii.*
Auricula stenostoma, Küster, is the same as *Tralia cingulata.*
Auricula bidens, Say of Pot. et Mich. Mr. Say never described any such species.

ALEXIA, (Leach), Gray.

Fig. 2.

Animal of *Alexia myosotis.*

Foot simple beneath, without a transverse groove.

Fig. 3.

Jaw of *Alexia myosotis.*[1]

Jaw narrow, slightly arcuate, extremities but little attenuated, striæ obsolete, scarcely any median projection. Lingual dentition, see p. 1, Fig. 1.

Shell oblong-ovate, thin, spire pointed; last whirl large, rounded at base; aperture rather broad, oval, acuminating; parietal wall furnished with from one to five tuberculous laminæ; columellar fold oblique; peristome expanded, armed with teeth, or thickened within.

But one species is known to inhabit North America. Most of the few foreign species inhabit the coasts of the Mediterranean, though the genus is represented in South America and the West Indies.

Alexia myosotis, Draparnaud.—Shell elongate-oval, thin, semi-transparent, smooth and shining; dark horn-color, with a narrow reddish sutural line; spire produced with an acute apex; suture distinctly impressed; whirls from seven to eight, the upper ones rather convex, the last one elliptically ovate, equalling five-sevenths of the shell's length; aperture subvertical, about four-sevenths the length of the shell; peristome somewhat expanded and thickened, sometimes furnished with tooth-like folds on its inner side; its basal termination appressed to the shell, slightly reflected over a minute perforation, and turning upwards till it blends with the columellar fold, which winds into the aperture; the parietal wall is furnished with a white, transverse, thin, and sharp denticle, and a second smaller, much less prominent one, placed above it. Greatest diameter 4, length 8 millimetres.

Fig. 4.

Alexia myosotis.

Auricula myosotis, Draparnaud, &c.

Auricula denticulata, Gould, Invert. of Mass. 199, f. 129 (excl. *Voluta denticulata,* Mont. et syn. suis.) (1841), not of Montfort.

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[1] From Moquin-Tandon.

Auricula denticulata, DeKay, N. Y. Moll, 58, pl. v, f. 91, 93 (excl. *Voluta denticulata*, Mont. et syn.), nec Montfort.

Melampus borealis, Conrad, Am. Journ. Sc. [2], XXIII, 345 (1833).

Alexia myosotis, Pfeiffer, Mon. Auric. Viv. 148; Brit. Mus. Auric. 114. —W. G. Binney, T. M. IV, 172, pl. lxxv, f. 33; pl. lxxix, f. 16.

Carychium (*Phytia*) *myosotis*, Moquin-Tandon, Moll. Fr. II, 417, pl. xxix, f. 33–39; pl. xxx, f. 1–4.

Conovulus myosotis, Reeve, Br. L. & Fr. W. Sh. 130 (1864).

Animal short, about one-half the length of the shell, dirty white, darker on the head and tentacles; eyes black, placed at the inner base of the feelers; feelers quite short, wrinkled, bulbous at tip, sufficiently dark to be visible through the thin shell when the animal withdraws itself; head continued beyond the tentaculæ into an obtuse, short, bilobed snout; the shell is carried horizontally on the animal's back; the obtusely pointed posterior termination of the foot is just visible beyond the shell; the animal is sluggish in its movements. (See p. 4, Fig. 2.)

Jaw. (See p. 4, Fig. 2.)

Lingual dentition. (See p. 1, Fig. 1.)

I have received specimens of this species from Nova Scotia to Rhode Island. It is also a well-known inhabitant of parts of the coasts of England, France, Spain, &c.

I have placed this shell in this genus on the authority of Pfeiffer and of Adams' genera. It has been placed in many different genera by European authors. In America it has been considered an *Auricula* by Gould and others, until Stimpson classed it among the *Melampi*. From the exterior of the animal there appears no difference between it and *Melampus bidentatus*. It does not even agree with the animal of *Alexia*, given by Adams in the Genera of Recent Mollusca, which I have copied on pl. 75, fig. 22, of The Terrestrial Mollusks. This figure represents the true *Alexia denticulata*, Montfort, with which Gould confounds this species. The shell is also quite distinct. It is, however, united to *Alexia myosotis*, by Forbes and Hanley, in their work on British Mollusca, and by Moquin-Tandon. Pfeiffer considers them distinct, as does also Reeve.

It is probably an imported species, as Stimpson remarks (Sh. of New Eng.), being found only in the Atlantic seaports. At Boston it is common on old wooden wharves in the harbor. It is also found on isolated stones which are immersed by the rising tide at least four hours out of the twelve. When placed in

fresh water it becomes benumbed and dies; it will live without water in captivity several days.

There can be no doubt of *M. borealis*, Conrad, being identical with this species. Conrad's description is given below.

Melampus borealis.—Shell ovate-acute, elongated; pale horn-color, with darker longitudinal bands; whirls six or seven, with a revolving impressed line below the suture; spire elevated, conical; columella with three distant and distinct plaits, the middle one most prominent; aperture obovate-acute. Length about one-fourth of an inch.

This small species of *Melampus* has been found sparingly on the coast of Rhode Island, by Lieut. Brown, of Newport. It is similar in form to a *Bulimus*, and is very unlike the common species with which it associates. (*Conrad.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8743	4	Massachusetts.	W. G. Binney.	Cabinet series.
8799	12	"	W. Stimpson.	.....

CARYCHIUM, Müller.

Fig. 5.

Carychium exiguum.

Foot not transversely divided beneath.

Shell pupa-shaped, very thin, transparent, with but few whirls; aperture suboval; with one dentiform columellar fold, sometimes obsolete; parietal wall with 1 or 2 teeth; peristome expanded, terminations not approximating, the right hand one with one internal tooth.

Fig. 6.

Lingual dentition of *Carychium exiguum.*

Jaw slightly arched, without ribs or marginal denticulations, hardly striated towards the margin.

Teeth in slightly bent cross series, central equilateral, narrow, laterals broad, short, denticulated.

But very few species of this genus have been described, most of which are from Europe. Animal terrestrial.

Carychium exiguum, Say.—Shell elongated, tapering at both ends, white, translucent, shining; apex rather obtuse; whirls five to six,

convex, very oblique, with transverse striæ; suture distinct, impressed; aperture obliquely oval, white, with a prominent plait on the columellar margin, about midway between the extremities of the lip, and a slightly prominent fold near the junction of the lip with the umbilical extremity of the shell; lip thick, reflected, flattened; umbilicus perforated. Length $1\frac{3}{5}$, diam. $\frac{3}{4}$ mill. Aperture $\frac{1}{2}$ mill. long.

Fig. 7.

Carychium exiguum.

Fig. 8.

Carychium exiguum, greatly enlarged.

Pupa exigua, Say, Journ. Acad. II, 375 (1822); ed. Binney, 26.—Gould, Bost. Journ. III, 398, pl. iii, f. 20 (1841); IV, 358 (1843); Invertebrata, 191, f. 122 (1841).—DeKay, New York Fauna, 49, pl. iv, f. 46 (1843).—Adams, Vermont Mollusca, 158, fig. (1842).

Bulimus exiguus, Binney, Terr. Moll. II, 286, pl. liii, f. 1.

Carychium exiguum, Gould, in Terr. Moll. II, 286.—Chemnitz, ed. 2, 61, pl. i, f. 13, 14.—Pfeiffer, Mon. Auric. 165; Brit. Mus. Auric, 127; Wiegm. Arch. 1841, I, 224.—W. G. Binney T. M. IV, 178.—Frauenfeld (1847), Akad. der Wiss. XIX, 79; Zool. Bot. Wien. IV, 10, pl. 1, f. 1 (1854).—Bourguignat, Mag. Zool. 1857, 209.

Carychium exile, H. C. Lea, Am. Journ. Sc. [1], XLII, 109, pl. i, f. 5 (1841).—Troschel, Ar. f. Nat. II, 128 (1843).

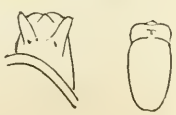
Carychium existelium, Bourguignat, *l. c.* 220.

Carychium euphœum, Bourguignat, *l. c.* 221.

Has been found in the New England, Northern and Middle States, in South Carolina, Arkansas, and Texas.

Animal colorless; tentacles stout, hyaline, one-third the length of the foot. The foot is short, thick, distinctly divided into two segments.[1] the anterior of which is bilobed, and projects, when the animal is in motion, considerably in advance of the head. Eyes oval, situated on the back, near the base of the tentacles. Its motions are very sluggish. It carries the shell directed horizontally; the shell is so transparent that the viscera of the animal may be seen through it.

Fig. 9.



Carychium exiguum.

It has been said to resemble *Carychium minimum*, of Müller, but neither the figure nor description, as given by Draparnaud, correspond with our shell.

It is found under stones and fragments of wood, and especially among moss, in damp places. It is the only species of this

[1] This does not agree with the generic description of *Carychium*.

family inhabiting the interior, but though found over a wide extent of country, it still possesses a fondness for the sea in common with the other species of the family. Around Boston it is found at or below the surface in swamps, growing among mosses.

This minute shell is well known in American cabinets as a *Pupa*. Say described it as such in 1822, though he mentions the probability of its being a *Carychium*. It has been described since that time as a *Pupa* by Gould, DeKay, and Adams, and catalogued among the species of the same genus by all the American writers who have mentioned it, until 1851, when its correct position was pointed out by Stimpson (Shells of New England) and Gould (Terr. Moll. II). The former places it in his family of *Melampidæ*.

Dr. Binney, in 1843 (Boston Journal, p. 106), considers it a *Pupa*. In the Terrestrial Mollusks he places it under *Bulimus*.

In 1852, Jay removed it from *Pupa* to *Carychium* (Cat. p. 263).

Notwithstanding its distinct generic peculiarities having been pointed out in 1851, we find the shell considered as a *Pupa* in several American catalogues as late even as 1857 (*vide* Boston Proc. VI, 128).

In Europe we find its true position pointed out by Pfeiffer as early as 1841, and by all subsequent writers.

In the fourth volume of the Terrestrial Mollusks I have given copies of the original descriptions of this species, and a figure of *C. exile*.

Lingual dentition (see p. 6).

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8440	7	.....	.....	.....

Spurious Species.

Carychium armigera, *contracta*, and *rupicola*, of Say, and *C. corticaria*, of Ferussac (Tabl. Syst.), are species of *Pupa*.

Subfamily MELAMPINÆ.

Animal amphibious, or living in brackish water. Shell with the inner lip plicate; outer lip straight and acute.

MELAMPUS, Montf.

Foot bifid posteriorly. Shell ovate-conical; spire short, obtuse; aperture narrow, linear; inner lip with several transverse folds; outer lip acute, internally plicate.

Jaw —?

Lingual membrane —?

Numerous species of this genus have been met with, widely distributed over the world.

Melampus olivaceus, Cpr.—Shell small, rather smooth, conical; spire depressed, obtusely angulated below the suture, which does not distinctly separate the whirls; color dirty white, with irregular patches or revolving lines of dark red or purplish; epidermis olive-colored; on young or very fresh specimens there are sometimes microscopic revolving lines near the base of the shell, and on the spire, which cross the delicate lines of growth so as to present under the microscope a granulated surface; whirls seven to nine, the upper ones distinguished only by means of the lens, and flattened; aperture long, equalling $\frac{1}{1}\frac{1}{3}$ of the shell, edge variegated in color by the termination of the reddish bands on the white ground of the shell, within white; the outer lip is furnished with numerous sharp, white laminæ, in the specimens before me varying from 1 to 9; the parietal wall of the aperture is covered with an almost imperceptible shining, callus; there is one constant, prominent, elevated white tooth-like lamina revolving within the shell, which is usually placed within two smaller shorter ones; on the columella there is also a stouter lamina entering into the aperture, and passing outwards and curving downwards so as to join the termination of the labium. Length 13, diam. 18 mill.

Fig. 10.

Melampus olivaceus.

Melampus olivaceus, Carpenter, in Reigen Cat. of British Museum, 178 (1856).—W. G. Binney, T. M. U. S. IV, 27, pl. lxxix, f. 8.

San Diego to Mazatlan (Reigen Cat.).

This is the first species of the family *Auriculacea* found on the Pacific coast of North America. There were numerous specimens found by M. Reigen, which Mr. Carpenter describes as dis-

tinguished generally by the olive-green epidermis, variegated with purplish-brown patches. I find the number of laminæ in the aperture very variable, but the two prominent ones on the labium are constant in all the individuals I have had the opportunity of examining.

The figure is taken from a specimen received from Mr. Carpenter.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8366	1	W. Coast.	.....	.....
3414	9	"	.....	.....
8550	3	"	.....	Cabinet series.

Melampus bidentatus, Say.—Shell imperforate, elliptically-ovate, rather thin, shining when perfect, but usually found much eroded; the surface is marked with longitudinal wrinkles, and very minute revolving striæ; horn-color, or grayish-red, often with revolving, narrow rufous bands, four or five in number; suture well marked; spire short, and usually obtuse, often somewhat eroded; whirls usually six, the upper ones flattened, the body whirl equalling about $\frac{5}{6}$ of the entire length of the shell, and obtusely angulated at its greatest width; aperture hardly oblique, very long and narrow, enlarging gradually towards the base, about $\frac{5}{7}$ the length of the shell; peristome very thin and sharp, not reflected, on the interior furnished with no laminæ, or with from one to seven; these laminæ are elongated, white, and do not reach the margin; they are usually separate, placed at irregular intervals, but sometimes are found on a longitudinal elevated, white callus; they enter but a short distance into the aperture; the parietal wall of the aperture is covered with a thin, shining, enamel-like callus, and bears on its lower half a single, white, prominent and transverse tooth, entering into the aperture; the columellar is also furnished with a white, tooth-like fold, commencing at the termination of the sharp peristome, and revolving upwards into the interior of the shell; this fold does not extend far into the aperture, as all the internal whirls and axis of the shell are early absorbed by the animal.

Fig. 11.

Melampus bidentatus.

Fig. 12.

Melampus bidentatus.

Length of an unusually large individual 13, breadth 7 millimetres.

Melampus bidentatus, Say, Journ. Acad. Nat. Sc. Phila. II, 245 (1822); Binney's ed. 84.—Russell, Journ. Essex Co. Nat. Hist. Soc. I, part 2, 67 (1839).—Pfeiffer, Mon. Auric. Viv. 45 (excl. *Mel. borealis*).—W. G. Binney, T. M. IV, 156, pl. lxxv, f. 23.

Melampus biplicatus, Pfeiffer, Mon. Auric. Viv. 21; Br. Mus. 14.

Melampus? jaumei, Pfeiffer, Mon. Auric. Viv. 25; Brit. Mus. Cat. 18.

Auricula cornea, Deshayes, Encycl. Méth. II, 90 (1830); Ib. in Lam. ed. 2, VIII, 339; ed. 3, III, 390 (1839).

Auricula bidentata, Gould, Inv. Mass. 197, f. 131 (1841).—DeKay, N. Y. Moll. 57, t. v, f. 92, 1, 2, 3 (1843).—Küster, Chemn. ed. 2, Auric. 41, pl. vi, f. 7–11.

Not *Auricula bidens*, Potiez et Michaud, Gal. 201, pl. xx, f. 9, 10.

Auricula jaumei, Mittre, Rev. Zool. (Mars, 1841), 66.

Auricula biplicata, Deshayes, Encycl. Méth. II, 91.

Melampus bidentatus, var. *lineatus*, Say, p 46 of ed. Binney.

Melampus bidentatus, β, Pfeiffer, Mon. Auric. 46.—Var. a. DeKay, *l. c.*

Along the whole coast from New England[1] to Texas. A very common shell among the grass of salt marshes near high water mark.

Animal about as long as the shell, and the foot is transversely bifid; tentacula somewhat wrinkled, cylindrical, rather smaller towards the tips, which are obtuse or rounded; eyes placed at the inner base of the tentacula; rostrum somewhat wrinkled, nearly as long as the tentacula, bilobate before; foot, anterior segment emarginate behind, posterior segment bifid at the extremity; all above, with the exception of the tentacula and rostrum, glabrous, reddish-brown, beneath paler. (*Say.*)

The shell when young is quite pretty, being shining and often variegated by the revolving bands. But few mature shells are met with in a perfect condition. They are usually much eroded. From the toothless outer lip to that bearing a heavy callus ridged with transverse laminæ, every intermediate variety is found. The absence of the laminæ is equally common in mature and young shells.

Authentic specimens of this species are still preserved in the collection of the Academy of Natural Sciences of Philadelphia.

The original descriptions of Mittre and Deshayes are given in Terr. Moll. IV. I have seen authentic specimens of neither of their shells. The descriptions are merely copied by Pfeiffer, in the works referred to in the synonymy.

Say designates by the name of *lineatus*, a form peculiar for its revolving lines or bands and more narrow base of the aperture (*vide* Binn. ed. p. 85). I have met with none sufficiently marked to form a variety, much less a distinct species. The revolving

[1] Gould mentions its being said to have been found living with a *Planorbis* at Windsor, Vt. If so, it must be adapted to a remarkable difference of station, being usually found near the sea. Pfeiffer also gives Vermont as the habitat, probably on the above authority.

lines are commonly found on young specimens. DeKay mentions this as var. *a*, Pfeiffer as *β*. The latter author also describes a var. *γ*:—

Fig. 13.

M. bidentatus, var. *lineatus*.

Last whirl sub-excavated below the suture, minutely spirally striated; lip with a white ridge of callus within the dark-colored margin, with from 6–10 regular folds.

Georgia. (*Pfeiffer.*)

He quotes in the synonymy of this variety *Mel. borealis*, Conrad, of Cuming's collection. Conrad's species is much more likely to be *Alexia myosotis* than any variety of *Mel. bidentatus*.

Potiez & Michaud describe and figure quite a distinct shell under the name of *Auricula bidens*, Say.

Stimpson gives precedence to Deshayes's name *corneus*. Say's name has eight years' priority, and is not pre-occupied in the genus *Melampus*. It was while treated as an *Auricula* that any question existed in regard to its specific name.

Pl. 75, Fig. 23, of the Terrestrial Mollusks, IV., represents a specimen not furnished with laminæ within the peristome.

The date of publication of this species is erroneously quoted by Pfeiffer as 1821. The title-page of the first part of Vol. II of the Academy Proceedings bears this date. The description was actually published at the date given by me.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8436	8	Georgia.	Dr. J. Lewis.	.....
8437	8	Indianola, Tex.	G. Wurdemann.	.....
8438	12	Charleston, S. C.	Lieut. Kurtz.	.....
8439	10	Indianola, Tex.	.....	.....
8441	3	Charleston, S. C.	Lieut. Kurtz.	.....
8800	20+	St. Simon's Island, Ga.	.....	.....
8801	100?	Massachusetts.	W. Stimpson.	.....
8804	5	Key West.	.....	.....
8822	11	Indian Key, Fla.	G. Wurdemann.	.....
8823	3	Texas.	Capt. Pope.	.....

Fig. 14.

Melampus flavus, twice natural size.

Melampus flavus, Gmel.—Shell imperforate, obconic, smooth, chestnut-colored, with three light, narrow bands; spire short, convex conic; suture slightly impressed; whirls from nine to ten, the upper ones flattened, the last about equalling three-fourths of the length of the shell, arcuately ridged below; aperture subvertical, narrow, angulated below; one deep parietal fold, one subvertical, stout, columellar fold, extended towards the base; peristome straight, acute, its outer margin reddish, thickened with white within and fur-

nished with ten short, transverse ribs, its columellar portion expanding and callous. Length 12, breadth $8\frac{2}{3}$; length of aperture $9\frac{1}{2}$, breadth at the middle 3 millimetres.

Lister, Hist. t. dcccxxxiv, f. 60.—Favanne, Conch. t. lxv, f. H, i.
Auricula mídæ parva, &c., Mart. & Chemn. II, 119, 126, t. xliii, f. 445.
Voluta, n. 106, Schröter, Einl. I, 272.
Voluta flava, Gmelin, Syst. 3436, No. 5.—Dillwyn, Cat. I, 506, n. 17.
Voluta flammea, γ, Gmelin, *l. c.* 3435, n. i.
Bulimus monile, Bruguiere, Encycl. Méth. I, 338, n. 70.
Melampa monile, Schweigger, Handb. 739.
Conovulus monile, Goldfus, Hand. 657.
Conovulus flavus, Anton, Verz. 1776.
Auricula monile, Ferussac, Podr. 105.—Lamarck, An. sans Vert. VI, 2, 141; ed. Desh. VIII, 333.—Küster in Chemn. ed. 2, Auric. 30, pl. iv, f. 7–9.
Auricula flava, Deshayes in Lam. VIII, 33.—Petit, Journ. Conch. II, 427 (1851).
Auricula coniformis, Orbigny, Moll. Cuba.
Melampus monile, Lowe, Zool. Journ. V, 292.
Melampus flavus, Adams, Contr. 42, 186.—Poey, Mem. I, 394.—Pfeiffer, Mon. Auric. Viv. 21; Brit. Mus. Auric. 14.—W. G. Binney, T. M. IV, 186, wood-cut.
Melampus torosa, Mörch, Cat. Yoldi, 38.
Melampus monilis, Shuttleworth, Diag. 7, 162.

A West Indian species, found in Florida by Mr. Bartlett.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8542	1	Florida.	W. G. Binney.	Cabinet series.

Melampus coffea, Lin. — Shell imperforate, cone-shaped, very solid and heavy, smooth and shining in fresh specimens, with delicate wrinkles of growth, and very numerous microscopic revolving lines; light fawn-color when deprived of its russet epidermis, with three or four revolving bands of white on the body whirl, of which the uppermost is broadest; suture moderate; spire short, conic, apex black, shining, pointed; whirls from nine to ten, the upper ones flattened, the last obtusely angulated below the suture, $\frac{7}{10}$ the length of the entire shell; aperture subvertical, long and narrow, gradually widening towards the base of the shell, about $\frac{6}{10}$ the entire length of the shell; peristome acute, not reflected, but thickened within by a heavy white callus, extending as high up as the carina of the body whirl; on this callus are from fifteen to twenty-two white, transverse laminæ or ridges, not reaching the edge of the peristome, and not

Fig. 15.

Melampus coffeus, natural size.

entering far into the aperture; sometimes there is a second and even third series of these laminæ visible within the aperture; on the parietal wall are two elevated, white, entering folds, the upper one much more prominent; the columella is covered with a shining, brown callosity, and furnished with one rather prominent fold, which commences at the termination of the peristome, and winds upwards into the interior of the shell; the interior whirls and axis are entirely absorbed. Diameter of a large specimen, 10, length 19 diameters.

Bulla coffea, Linnæus, Syst. Nat. X, 729.

Voluta coffea, Linnæus, Syst. Nat. XII, 1187.—Schröter, Einleit. II, 200.—Gmelin, Syst. Nat. XIII, 3438.—Dillwyn, Descr. Cat. I, 506.

Voluta minuta, Gmelin, Syst. 3436, ex parte.—Dillwyn, *l. c.* 506.

Auricula midæ parva, fusca, albo-fasciata, Martini et Chemnitz, II, 119, pl. xliii, f. 445? (or *Mel. flavus?*).

Ellobium barbadense, Bolten, Mus. 106, ed. nov. p. 74?

Bulimus coniformis, Bruguiere, Encycl. Méth. I, 339.

Melampus coniformis, Montfort, Conch. Syst. II, 318.—Lowe, Zool. Journ. V, 292.

Melampus coffeus, Adams, Gen. Rec. Moll. t. lxxxii, f. 7, 7*a* (no desc.).—Pfeiffer, Mon. Aur. 28; Br. Mus. Cat. 19.—W. G. Binney, T. M. IV, 162, pl. lxxv, f. 21, 25.

Melampa minuta, Schweigger, Handb. 739.

Tornatelle coniforme, Blainville, Dict. Sc. Nat. pl. Malac. liv, f. 4.

Auricula coniformis, Lamarck, Hist. an. s. Vert. VI.—Deshayes in Lam. VIII, 332; ed. 3, III, 387.—Potiez et Michaud, Gal. I, 202.—Reeve, Conch. Syst. II, t. clxxxvii, f. 7 (teste Pfr.).—Sowerby, Conch. Man. 77, f. 298?—Chemnitz, ed. 2; Auric. 31, t. iv, f. 14–17.

Auricula ovula, Orbigny, Moll. Cub. I, 187, t. xiii, f. 4–7 (1853).

Conovulus coniformis, Lamarck, Encycl. Méth. t. cccclix, f. 2 (no desc.).—Woodward, Man. Moll. 173 t. xii, f. 37 (1854).

The only specimens I have seen were collected in Florida, by Mr. Bartlett, more than ten years ago. It is a well known and very common shell in the West Indies. Referred also to Mexico by Pfeiffer.

Mr. Thomson sent me specimens from New Bedford, where they were probably introduced by the schooners of the live-oak trade running to Florida.

Animal (see T. M. U. S. IV, pl. 75, fig. 21) about the length of the shell; tentacles short, pointed, eyes at their interior base; proboscis extending beyond the head, bilobate, bluntly terminating; posterior termination of the foot short, bifid, color dark-brown.

Figure 25 of plate 75, of Terr. Moll. IV, is a fac-simile of

Orbigny's figure of *Auricula ovula*. It is a good representation of our Florida shells.

West Indian specimens are well known in cabinets. I know of no American specimens, with the exception of the few collected by Mr. Bartlett.

Plate 79, fig. 6, of T. M. IV, may represent a variety of this species. It is from Texas.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8821	5	Indian Key, Fla.	G. Wurdemann.	Cab. ser. Var. and sp. dist.? *Vide* T. M. IV.
8824	1	Texas.	Capt. Pope.	Cab. ser. Var. and sp. dist.? *Vide* T. M. IV.

Spurious Species of Melampus.

Melampus borealis, Conrad, I have referred to *Alexia myosotis*.

Melampus denticulatus, Stimpson, is also identical with *Alexia myosotis*.

Melampus redfieldi, Pfr. (See T. M. IV, 170.)

Melampus pusillus, *floridanus*, and *cingulatus* (see *Tralia*).

Melampus obliquus, Say.—Obconic, reddish brown, rather thick; spire very little elevated; whirls eight or nine, wrinkled across; labium with two very distinct teeth, and an intermediate and equidistant, slight obtuse prominence; inferior tooth very oblique, terminating at the base; labrum with about eight teeth or striæ, which terminate on the margin; base of the aperture a little contracted by the basal tooth. Length more than seven-twentieths of an inch.

I am indebted to Mr. Stephen Elliott for this species, who obtained it on the coast of South Carolina. It is closely allied to *Bulimus mœnile*, Brug., but it has no appearance of bands, which distinguish that shell. In the collection of the Academy are specimens from the West Indies. (*Say.*)

Melampus obliquus, Say, Journal Acad. Nat. Sc. Phila. II, 377 (Dec. 1822); Binn. ed. 27.—W. G. Binney, T. M. IV, 167.—Pfeiffer, Mon. Auric. Viv. 30.

Auricula obliqua, DeKay, N. Y. Moll. 58 (1843).

It is not now known what shell Say had in view when the above description was written. No authentic specimen is preserved, and no author has seen any shell from that locality answering to the characters laid down. DeKay mentions it among the extra-limital species in his report, his words being nearly a repetition of Say's. Pfeiffer repeats Say's words, and suggests the identity of the species with *Melampus coffea*. Say being familiar with that shell (*M. coniformis*, *vide* ed. Binn. p. 85), it seems hardly probable he would have described a variety of it.

The question must remain undecided until we are better acquainted with the species of the South Carolina coast.

FOSSIL SPECIES.

Melampus priscus, MEEK, Phila. Acad. Nat. Sc. Proc. 1860, 315.
Melampus (*Ensiphorus*) *longidens*, CONRAD, Pr. A. N. Sc. Phila. 1862, 584.

TRALIA, GRAY.

Fig. 16.

Animal of *Tralia*,[1] enlarged.

Foot posteriorly acute, entire.

Shell ovate, smooth; spire elevated; aperture narrow, linear, dilated anteriorly; inner lip usually with three oblique plaits; outer lip acute, sinuated posteriorly, internally with one or more transverse, elevated ridges.

This genus differs from *Melampus* in having the foot entire posteriorly, not bifid. It is not admitted by Pfeiffer.

Tralia floridana, SHUTTL.—Shell imperforate, ventricose, fusiform, thin, smooth, grayish, with varying chestnut bands; spire regularly conic, acute; suture linear; whirls ten, flattened, the last comprising three-fifths of the length of the shell, obsoletely angulated above, and very much smaller at its base; aperture subvertical, narrow, angular; two parietal plicæ, one strong, one on the columella, obliquely continued towards the base; peristome acute, its right side in adult specimens armed with transverse, white, subequal folds, its columellar portions both short and callous. Length $7\frac{1}{2}$, diameter $4\frac{1}{3}$; aperture in length almost 5, in breadth $1\frac{1}{3}$ millimetres.

Fig. 17.

Tralia floridana.

Auricula floridana, SHUTTLEWORTH, MSS.
Melampus floridanus (*Tralia*), ADAMS, Pr. Zool. Soc. II, 1854 (no desc.).—PFEIFFER, Malak. Blatt. (1854); Mon. Auric. Viv. 36; Brit. Mus. Cat. 25.—W. G. BINNEY, T. M. IV, 165, pl. lxxv, f. 30.

Found at Florida Keys.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8541	2	Florida.	W. G. Binney.	Cabinet series.

[1] I do not know what species this represents. It was drawn from nature by Dr. Stimpson, in Charleston harbor.

Tralia pusilla, Gmel.—Shell imperforate, lengthened-ovate, solid, shining, smooth, marked with microscopic revolving lines, most easily detected on the spire; reddish-brown, with lighter, hardly perceptible revolving bands; suture moderate, less ragged than in the other species; spire elongate-conic; apex acute, shining, black; whirls six to seven, the upper ones flattened, the body whirl obtusely carinated, regularly decreasing in diameter towards the base, and equalling about $\frac{18}{23}$ the length of the shell; aperture subvertical, narrow, rapidly widening towards its base, and equalling in length about $\frac{15}{23}$ of the entire shell; peristome simple, acute, within thickened by callus, and furnished with a rather blunt, short, transverse, not very prominent lamina; the basal termination of the peristome is appressed to the shell, and imperceptibly terminates in a columellar lamina which ascends and winds into the aperture; the columella and parietal wall are covered with a shining callus; there are two parietal teeth, which are white, and enter into the aperture of the shell, the lower one being much the smaller. Internal septæ absorbed. Greatest diameter 5, length 11 millimetres.

Fig. 18.

Tralia pusilla.

Auricula midæ parva fusca unicolor, Martini & Chemnitz, II, 119, t. xliii, f. 446.—Favanne, t. lxv, f. H, 4 (teste Pfr.).

Voluta, n. 108, Schröter, Einl. I, 273.

Voluta pusilla, Gmelin, Syst. 3436 (teste Pfr.).—Dillwyn, Cat. I, 507.—Wood, Ind. pl. xix, f. 20.

Voluta triplicata, Donovan, Brit. Shells, V, pl. cxxxviii (1808).—Montagu, Test. Brit. Suppl. 99.—Dillwyn, Cat. 507.—Wood, Ind. pl. xix, f. 19.

Bulimus ovulus, Bruguiere, Encycl. Méth. I, 339.

Melampa ovulum, Schweigger, Handb. 739 (teste Pfr.).

Auricula ovula (*Conovula*), Ferussac, Tabl. Syst. 108 (absq. desc.).

Auricula nitens, Lamarck, An. s. Vert. VI, 2, p. 141.—Deshayes in Lam. VIII, 332; ed. 3, III, 387.—Chemnitz, ed. 2, Auric. 18. pl. ii, f. 11–13.

Auricula pusilla, Deshayes in Lam. VIII, 332.

Conovulus nitens, Voight in Cuv. Thierr. III, 112 (teste Pfr.).

Conovulus pusillus, Anton, Verz. 48.

Melampus pusillus, Pfeiffer, Monog. Auric. Viv. 48; Brit. Mus. Auric. 34.—W. G. Binney, T. M. 168, pl. lxxv, f. 29.

Tralia pusilla, H. et A. Adams, Gen. Rec. Moll. II (Sept. 1855), 244, pl. lxxxii, f. 8.

The only American specimens I have seen are in my collection. I detected them among marine shells and sand, collected in Florida by Mr. Bartlett.

This species is well known in cabinets by specimens from the

West Indian Islands, in several of which it exists. Pfeiffer also refers it to the Sandwich Islands.

It is readily distinguished by its shining, mahogany-colored shell. It varies less than most of the *Melampi*.

Tralia cingulata, Pfr.—Shell imperforate, fusiform, heavy and thick, shining, polished, with numerous microscopic revolving lines, most prominent on the last whirl; brownish, with numerous irregularly wide, white revolving bands; spire convex-conic, terminating in an acute transparent point; suture simple; whirls ten, the upper ones flattened and narrow, the last one tapering towards the base, and equalling about two-thirds the length of the shell; aperture hardly oblique, very narrow, divided at its base by a stout, sharp columellar fold, which ascends and winds obliquely into the aperture; peristome simple, acute, armed within with from six to eight elongated laminæ, not quite reaching the edge of the lip, the lower one being most fully developed. Length of the specimen before me 11, breadth 5; length of aperture 6 millimetres.

Fig. 19.

Tralia cingulata, 2½ natural size.

Auricula cingulata, Pfeiffer in Wiegm. Arch. f. Nat. 1840, I, 251.—Chemnitz, ed. 2, Auric. 40, t. xl, f. 4–6.

Auricula oliva, Orbigny, Moll. Cub. I, 189, t. xii, f. 8–10.

Auricula stenostoma, Küster, olim, in Inc.ds2aifeP)e.f. ft tes re fŧ

Melampus cingulatus, Pfeiffer, Mon. Auric. Viv. 18; Brit. Mus. Cat.—W. G. Binney, T. M. IV, 161, pl. lxxv, f. 12–13.

Tralia, H. & A. Ad.

The only American specimens of this species I have seen, were collected in Florida by Mr. Bartlett. The species is also found in Cuba, Jamaica, and Porto Rico.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8803	5	Florida.	W. Stimpson.	Cabinet series.

LEUCONIA, Gray.

Foot divided inferiorly by a transverse groove.

Shell ovate-oblong, imperforate, smooth; spire conical; aperture elongate, oval; inner lip with two plaits anteriorly; outer lip smooth internally, the margin simple, acute.

Of the six species of this genus described, two are found in

the West Indies, three in Europe, and one of doubtful identity is referred to the United States.

Leuconia sayii, Küster.—Shell small, conic-ovate, shining, horn-colored, striate; spire acute, broadly conic, whirls five, rather convex; aperture oblong, columella biplicate. Length 2½ lines, diam. 1½.

United States. (*Küster.*)

Fig. 20.

Leuconia sayii.

Auricula sayii, Küster in Chemn. ed. 2, 12, pl. vi, f. 14, 15.
Leuconia sayii, Pfeiffer, Mon. Auric. 157; Brit. Mus. Auric. 170.—W. G. Binney, Terr. Moll. IV, 177, pl. lxxv, f. 34.

The above is Küster's description. The figure I give is a fac-simile of one of his. This is the only information I have been able to obtain with regard to the species. It has not been described by any other author but Pfeiffer, who merely quotes the above description, not having ever seen the shell.

Küster's figure represents no known American shell; there exists, however, a strong resemblance between it and his figure of *Alexia myosotis*. His original specimen may have been a variety of that species.

Pfeiffer compares the species with *Melampus infrequens*, Ad.

PEDIPES, Adanson.

Foot divided inferiorly by a transverse groove.

Shell subglobose, imperforate, transversely striated; spire short, obtuse; aperture narrow; inner lip flattened, excavated, with three plaits, the posterior the largest; outer lip posteriorly sinuated, with two teeth internally; margin acute.

Species of *Pedipes* have been found at Panama, in Africa, the West Indies, Madeira, and Isle of France. They are said to inhabit crevices of rocks, especially those exposed to the full force of the tide. The generic name was suggested by the peculiar mode of progression. When the animal walks, the hind part of the foot is fixed, and the fore part, which is separated from the hind part by an extensible groove, is advanced, and the hind half is then drawn forwards so as to touch the anterior half, and so progression is effected by a series of little steps. This movement

is executed with such quickness that the *Pedipes* is one of the most agile of mollusks.

Pedipes lirata, W. G. Binney.—Shell imperforate, globose-conic, solid, shining, straw-colored, regularly marked with revolving ridges; spire short, depressed, apex obtuse; whirls three, the upper ones short, the lower one about equalling five-sixths the length of the shell; aperture semicircular, its parietal wall covered with shining callus, and furnished with a thick, elevated, hooked and entering fold; columella furnished with two thick, acute, tooth-like processes, placed side by side; peristome acute, furnished on its interior with a shining callus, which is protracted into a high tubercle at its middle. Greater diameter $2\frac{1}{2}$, length $3\frac{1}{8}$; length of the aperture $2\frac{1}{2}$ mill.

Fig. 21.

Pedipes lirata, 4 times nat. size.

Pedipes lirata, W. G. Binney, Phila. Acad. Nat. Sc. Proc. 1860, 154.

Cape San Lucas, Lower California.

The specimen figured is the only one found. It may, perhaps, be somewhat related to *P. angulata*, Adams, of Panama, which I have not seen.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8567	1	Cape St. Lucas.	John Xantus.	Cabinet series. Type.

BLAUNERIA, Shuttl.

Shell imperforate, oblong-turreted, thin; aperture narrow, elongated; inner lip with a single plait, columella subtruncate; outer lip simple, straight.

Foot somewhat truncated in front, pointed behind, long as the shell's aperture; head large, projecting beyond the foot, forming a snout with dilated lips; tentacles short, cylindrical, eyes at their superior base.

But one species of this genus is known, the *B. pellucida.* It is one of those shells whose generic position cannot be ascertained without a knowledge of the characters of the animal. It was placed among the *Helicidæ* as *Achatina* and *Tornatellina*, as a *Glandina* among the *Oleacinidæ*, and among the Pectinibranchiates as *Odostomia*, until it was ascertained by Dr. Gundlach to belong to the *Auriculidæ.*

Blauneria pellucida, Pfr.—Shell sinistral, ovate-lanceolate, acuminate, pellucid, highly polished and glistening. Whirls seven, very oblique, scarcely convex, the last one somewhat ventricose towards the base, about two-thirds the length of the shell; aperture narrow ovate, acutely prolonged posteriorly; lip simple; turning up the columella it becomes thickened, and winds into the aperture in the form of a tooth-like lamella. Length 5 mill.; breadth $1\frac{2}{3}$; aperture 2 mill. long.

Fig. 22.

Blauneria pellucida.

Achatina (?) pellucida, Pfeiffer in Wiegm. Archiv. 1840, I, 252.—Gould in Binn. Terr. Moll. II, 294, pl. liii, f. 2.

Tornatellina cubensis, Pfeiffer, Symb. II, 130; Monog. Helic. Viv. II, 391.—Chemnitz, ed. 2, Pupa. 151, pl. xviii, f. 16, 17.

Blauneria pellucida, Pfeiffer, Malak. Bl. 1854; Mon. Auric. Viv. 153; Brit. Mus. Cat. 110.—W. G. Binney, T. M. IV, 175.

Odostomia? cubensis, Poey, Mem. I, 394.

Found in Florida, among small shells drifted in the sand.

It has been detected in Cuba, Jamaica, and Porto Rico, and has been introduced into England.

Binney is the only American author who mentions its existence in this country. He places it under *Achatina*. Gould, in Terr. Moll., leaves it in that genus provisionally, mentioning the doubt existing concerning it.

Spurious Species of Auriculidæ.

Otina zonata, Pfeiffer. *Vide Velutina zonata*, p. 22.

Family OTINIDÆ.

Lingual membrane, as in *Auriculidæ*, broad, teeth in numerous cross series. Head large, broad, obtuse, mouth vertically cloven, furnished with distinct jaws. Tentacles flattened, eyes at the upper part of their base.

Shell ear-shaped, colored; columellar margin simple; outer lip simple and acute.

Animal amphibious, living near the sea.

The species of this small family differ from the *Auriculidæ* in having flattened tentacles, and from the *Limnæidæ* in having the eyes on the upper part of the base of the tentacles, instead of at the inner edge of the base, and in having colored shells.

SPURIOUS SPECIES OF OTINIDÆ.

Fig. 23.

Velutina zonata.

Velutina zonata, GOULD, whose figure I copy (Invert. p. 242), is referred to this family under the name of *Morrillia zonata*, Gray (see Gen Rec. Moll. II, 645). It is a deep-water shell, without doubt belonging to *Velutina*. Pfeiffer describes it also among the *Otinea*, as *Otina zonata* (Mon. Auric. p. 12).

FAMILY LIMNÆIDÆ.

Lingual membrane armed with numerous, quadrate teeth, arranged in transverse rows, the central minute, the laterals

Fig. 24.

Lingual dentition of *Ancylus newberryi*.

uncinated or simply denticulated. Head with a broad, short muzzle, dilated at the end; mouth with one or more jaws; tentacles contractile, flattened or subulate, with the eyes sessile at their inner bases. Mantle margin variously modified; respiratory orifice at the right side. Foot flattened, lanceolate or ovate. Excretory orifices on the left side of the neck. Sexes united; male and female organs with separate orifices, on the right or left side.

Shell of a varied form, thin, horn-colored, usually with an oblique fold on the columella, and with the outer lip simple and acute.

Animal fresh-water, living in the water, usually coming to the surface to respire the free air.

The *Limnæidæ* are found in every quarter of the globe; but in North America most of the genera are represented, excepting *Chilina*, *Camptoceras*, *Amphipeplea*, *Latia*, &c. They are more plenty in species and individuals in the more temperate portions of the continent. Especially among the innumerable lakes of the British possessions do the large species flourish.

They are strictly aquatic in their habits, abounding in the small quiet streams and stagnant ponds, feeding exclusively on vegetable substances. They usually come to the surface to breathe the free air, but their organs of respiration must be adapted, in some species at least, to breathing through the medium of water, as they are occasionally found in circumstances precluding any possibility of an approach to the surface.

Their eggs are laid in clusters, surrounded by a gelatinous matter.

Many of the species possess the power of gliding along the surface of the water, shell downwards, and letting themselves down by means of a gelatinous thread.

From the fact of my finding young individuals only in the spring, and numerous dead full-grown shells during the late autumn and winter, I presume they arrive at maturity in one season. They are active during the spring, summer, and autumn, but bury themselves in the mud during winter, at least in the Northern States.

The *Limnæidæ* have been grouped by some authors according to the number of their horny jaws, but in the present stage of knowledge of them it seems to me preferable to adopt that division into subfamilies based upon the form of the shell, which is found to be spiral and elongate, spiral and flattened, or non-spiral and simply patelliform.

The shells of some of the various genera present considerable difference in form, but their characters are not as well marked or reliable as in the *Helicidæ*. I have therefore given, under the genus, a description of the typical form, leaving to the subgenera the descriptions of the various diverging forms.

So variable are the species in each of the American genera, and so imperfect is our knowledge of them, I have not attempted a full description of each species at this time. It seems best to me to give all the original descriptions both of true species and synonyms (translated when not in English), and a fac-simile of the original figure of each. My work must therefore be considered rather a report on the present state of our knowledge of the family than an exhaustive monograph. I am in hopes of obtaining material for a more perfect work at some future day.

Subfamily LIMNÆINÆ.

Shell spiral, more or less elongated, the last whirl large; aperture oblong.

LIMNÆA, Lamarck.

Tentacles flattened and triangular. Mantle with the front edge thickened. Foot short, rounded. Shell dextral, spiral, oblong, translucent, horn-colored; spire acute, more or less produced, last whirl ventricose; aperture large, wide, rounded in front; inner lip with an oblique fold; outer lip simple.

Fig. 25.

Animal of *Limnæa desidiosa.*

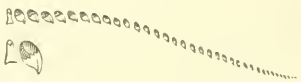
Jaws three, smooth; one upper, large, transversely oblong or ovate; two lateral, rudimentary, narrow, convex.

Fig. 26.

Jaws of *L. columella.*

Lingual membrane (of *L. columella*) broad, teeth crowded, numerous; central narrow, long, apex attenuated, recurved; laterals broad, blunt, apex recurved, denticulated.

Fig. 27.



Lingual membrane of *L. columella.*

This genus is found over almost the whole world, but prefers the more temperate portions of it. In North America, likewise, it is found in greater abundance and perfection in the lake region of the United States, and still more so in the British possessions. In the States bordering on the Gulf, and in Mexico, it is hardly represented.

The geographical distribution of the species is but little known. It seems certain that the boreal regions are inhabited by several species common to similar latitudes in Asia and Europe, such as *L. stagnalis* and *L. palustris.*

The name *Limnæa* is now universally adopted for this genus

It is useless, therefore, to refer here to the thirty synonyms quoted by Hermannsen.[1]

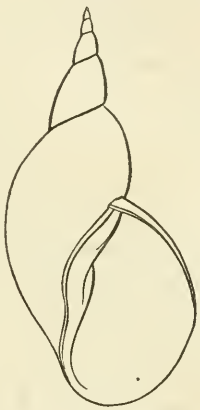
As a subgeneric name for the typical *Limnæa, Lymnus,* Montf. has priority—*Stagnicola,* Leach, being a synonym.

Limnæa stagnalis, Lin.—Shell elongated-ventricose; volutions six; spire regularly attenuated to an acute tip, rather shorter than the aperture; body whirl dilated, proportionally large; aperture ample; columella with the sinus of the fold profound, callus perfectly appressed upon the shell to the base.

Inhabits Lake Superior.

This shell exhibits very much the appearance of *L. stagnalis*, but its body whirl is less proportionally dilated. The callus of the labrum is perfectly appressed to the surface of the whirl even to the base, exactly as in *stagnalis.* I have seen but a single weathered and broken specimen, which was sent me for examination by my friends Messrs. Collins and Barnes, of New York. It was found in Lake Superior, by Mr. Schoolcraft. Since writing the above, Mr. Jessup presented me with several specimens, which he collected in Canandaigua and Cayuga Lakes. (*Say. L. appressa.*)

Fig. 28.



Limnæa appressa, Say.

Limnæa jugularis, Say, Nich. Encycl. 1817, 1818, 1819; ed. Binney, p. 46.—Haldeman, Mon. 16, pl. iv (1841).—DeKay, N. Y. Moll. 74, pl. v, f. 81 (1843).—Küster, Ch. ed. 2, p. 3, pl. i, f. 7.

Limnæa appressa, Say, Journ. Acad. Nat. Sc. II, 168 (1818); Binney's ed. 66.—Haldeman, Mon. 18, pl. v (1842).—Adams, Shells of Vermont, 153 (pamphlet 3), (1842).—DeKay, N. Y. Moll. 74 (1843).—Küster, Ch. ed. 2, 4, pl. i, f. 8–9.

Limnæa stagnalis, Linnæus, &c.—Sheppard (1829), Tr. Lit. Hist. Soc. Quebec, I, 196.—Kirtland, Am. Journ. Sc. [1], XXXI, 35, f. 10; Ohio Report, 200.—Anon. Can. Nat. II, 196, f. 1, 2, 1857.

Limnæa speciosa, Ziegler of Rossmassler, Icon. pt. 2, p. 96; pl. ii, f. 50 (1835).

This species ranges from Vermont, through the northern tier

[1] H. & A. Adams suggest the use of Klein's name *Auricula*, he being the first to notice and describe the genus. I protest against the use of his names in preference to the well-established names of authors who truly understood and followed the Linnæan system of generic nomenclature. (See Sill. Am. Journ. [2], XXXV, 429.)

of States, to the Pacific Ocean. It is also found in Oregon and southern Utah, though it occurs most plentifully in the lake region of British America. Specimens of it have been collected for the Smithsonian Institution by Mr. Kennicott, at Fort Resolution and Fort Simpson, and at Moose Factory, by Mr. Drexler.

From the means of comparison at my disposal I have no doubt of the identity of the European *Limnæa stagnalis* with this shell. Their proving to be the same will add another to the list of circumpolar species common to the two continents.

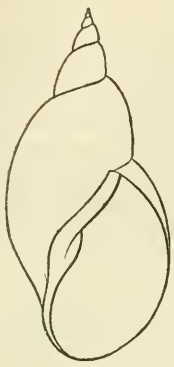
Authentic specimens of Mr. Say's *L. appressa* are still preserved in the collection of the Philadelphia Academy. They correspond well, though smaller, with the figure of *appressa* (Fig. 28), which I have copied from Haldeman. I have seen no authentic specimen of Say's *L. jugularis*, but have no doubt of its identity with the shell he afterwards called *appressa*, not only from his comparison of *jugularis* to *stagnalis*, but from the tradition of the earlier collectors, who always have considered them nearly related, if not the same. Mr. Say's description of *jugularis*, in the third edition of Nicholson's Encyclopedia (which is reprinted in my edition of his works), is extremely unsatisfactory, and would hardly be referred to the shell before me, without the words used by him in the first edition. Both are now given.

There is a species of this genus which resembles the *stagnalis* of Europe: we have named it *Limnæa jugularis*. Whirls about six, tapering; mouth within often brownish, lip white, column a little contracted in the middle; we have not a good specimen to describe or figure. (*Say, Nich. Encycl. first ed.*)

There is a species of this genus that we have named *Limnæa jugularis*, and which, in consequence of its having been found but once, must be considered as a doubtful inhabitant of the United States. It may thus be described: Shell tapering; whirls about six; suture not deeply impressed; aperture hardly equal to half the length of the shell, but little dilated; within brownish, particularly on the column, which is contracted in the middle; outer lip white, and almost imperceptibly repand within; umbilicus very distinct. Length one inch. A specimen was also brought from the West Indies, by Mr. L'Herminier, of Charleston. (*Say, 3d ed. Nich. Encycl.*)

Haldeman admits *L. appressa* as a distinct species with doubt, but describes it as more attenuated, lighter in color, and having the spiral striæ better developed than the typical *jugularis*. One of his figures of the latter is copied in my figure (Fig. 29).

Fig. 29.



Limnæa jugularis.

Adams and DeKay describe *appressa* as a distinct species.

The shell has been figured roughly and described by Dr. Kirtland under the name of *L. stagnalis*. I here give a fac-simile of his figure, and a copy of his remarks, omitting Dillwyn's words.

Fig. 30.

Limnæa stagnalis.

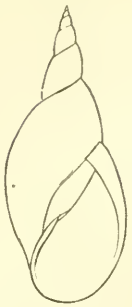
After leaving Trumbull, we enter Portage County (Ohio). In this county we found a number of beautiful ponds, from each one of which flows a perennial stream. One which lies a few miles south of our route, in Stark County, called Congress Lake, was, until recently, the only known locality of the fine univalve shell, *Limnæa stagnalis*. It was discovered by Dr. K. in the course of the last season. I have one in my possession which is two inches in length, with the body whirl three-fourths of an inch in diameter. As this rare and elegant shell has not been figured or described by any American Conchologist, a drawing is given at figure 10. The description is copied from Dillwyn, and appears to be so similar to that of our own shell, that there can be no doubt of its identity with the European species, although it is a rare fact, and which scarcely again occurs in all our long list of land and fresh-water shells. Geoffroy calls it "Le Grand Buccin." (*Kirtland.*)

An anonymous writer in the Canadian Naturalist also refers the shell to *stagnalis*, giving a copy of a figure of that species in a foreign journal.

The species has also been described and figured, as the following copies show, by Rossmassler, under the name of *Limnæus speciosus*, Ziegl. Haldeman quotes this description in the synonymy of *jugularis*, but afterwards refers it to *L. appressa*.

Shell imperforate, ovate-conical, with a long turreted acutely terminating spire, yellowish-brown, deeply striated, with very delicate striæ under the lens on the whole upper surface; seven whirls, the last not very ventricose, but only slightly arched; no trace of a margin above; the upper whirls form a very long and slenderly drawn-out spire; aperture ovate, acute above, on the left side cut out in a shallow heart shape; outer lip but slightly prominent, and very delicately imbricated; the columellar callus is quite thin and adheres so closely as to be distinguished almost

Fig. 31.



Limnæus speciosus.

wholly by its white color, and hardly by a perceptible elevation, leaving scarcely any trace of an umbilicus.

Animal ——?

Habitat.—In the fresh-water lakes of North America.

I compared twenty specimens from Lake Erie which appeared perfectly adult and whose characters were constant. This species certainly much resembles *L. stagnalis;* but the invariable tawny color, the decided almost regular striation, the narrower aperture, the outer lip less curved and not prominent, and, finally, the delicate, closely adherent, white columellar callus sufficiently distinguish it. (*Rossmassler.*)

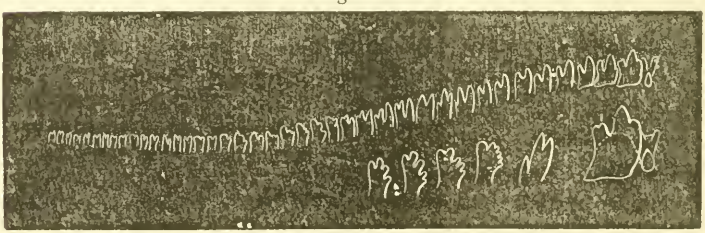
Moquin-Tandon (Moll. Fr. II, 471) places *L. appressa*, Say, in the synonymy of *L. stagnalis*, var. ζ, *roseolabiata* (*L. bicolor*, Mke, *L. stagnalis*, var. *obscurus*, Mke.).

Reeve (Brit. L. and Fr. W. Sh.) does not quote Say's species in the synonymy of *L. stagnalis*, but on p. 155 notices the marked degree of parallelism between, if not identity of, *L. limosa* and *L. catascopium*, *L. auricularia* and *L. macrostoma*,[1] *L. stagnalis* and *L. jugularis*, *L. palustris* and *L. elodes*, and *L. truncatula* and *L. desidiosa*.

Limnæa stagnalis is catalogued by Middendorf among the circumpolar species of Asia. It is found in Europe, Siberia, and Cashmere. Like many of our extreme northern species, it appears common to the three continents.

Fig. 32 represents the lingual dentition of an American speci-

Fig. 32.



Lingual dentition of *Limnæa jugularis.*

men of *Limnæa jugularis*. The central tooth is small, narrow, conical. There are 40·1·40 teeth, arranged in a transverse, curving row, of variable form. There are 103 rows in all.

[1] Rather *L. ampla.*

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8301	5	Michigan.	.....	.....
8306	5	Ruby Valley.	Capt. J. H. Simpson.	.....
8307	4	.....	W. Stimpson.	.....
8479	3	Lake Champlain.	W. G. Binney.	Cabinet series.
8954	3	Ft. Simpson, Br. Am.	R. Kennicott.	.....
9063	30+	Hudson's Bay.	Drexler.	.....
9067	50+	Grand Rapids, Mich.	Dr J. Lewis.	.....
8959	..	Ft. Resolution.	R. Kennicott.	.....
9135	5	Ft. Simpson.	"	.....
9140	5	Moose Factory.	Drexler.	.....
9175	50+	Vermont.	J. E. Chittenden.	.....
9182	2	Black River, N. Y.	Gen. Totten	.....
9165	4	Milwaukee.	I. A. Lapham.	.....
9154	6	Cayuga Inlet.	Mrs. H. W. Parker	.....
8245	3	Milwaukee, Wis.	I. A. Lapham.	.....
8246	3	Michigan.	.....	.....
8462	3	Southern Utah.	Capt. J. H. Simpson.	In al. with animals.
8473	2	Milwaukee, Wis.	I. A. Lapham.	.....
9285	5	Isle la Crosse.	R. Kennicott.	.....
9287	1	Otter Tail Creek, Minn.	"	.....
9290	20+	Great Slave Lake.	"	.....
9248	3	Lake Superior.	Dr. J. S. Newberry.	.....
9250	2	"	"	.....
9252	5	Rhett L., Cal.	"	.....
9244	5	.....	.....	.....
9322	4	E. of Ft. Colville, W. T.	N W. Bound. Surv.	.....
9325	12	Near Ft. Anderson, lat. [68°	R. R. McFarland.	.....

Limnæa lepida, Gould. — Shell very fragile, elongated, very acutely conical, subumbilicate, pale horn-color; whirls five, oblique, moderately convex, forming an acuminated spire; suture moderately impressed; surface smooth and shining, lines of growth faint, and when examined by a magnifier they are found to be rendered somewhat zigzag by distant, revolving furrows, which cross them. 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 $\frac{3}{5}$, breadth $\frac{1}{4}$ inch.

Fig. 33.

Limnæa lepida.

Lake Vancouver, Oregon.

Most closely allied to *L. pallida*, Adams, but is much more delicate, the spire more acuminate, the aperture larger and expanded, the fold of the pillar more developed, and the surface well characterized, when closely examined, by the flexuose lines. The whirls are much more oblique and less convex than in *L. desidiosa*. (*Gould.*)

Limnæa lepida, Gould, Proc. Boston S. N. H. II, 211 (1847); U. S. Ex. Ex. Moll. 121, f. 141, 141*a* (1852); Otia, 41.

The description and figure given above are both copied from Dr. Gould. The original specimens are preserved in the Smithsonian collection.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8571	.. ..	Lake Vancouver, Or.	Com. Wilkes.	Cabinet series.

SUBGENUS **RADIX**, MONTF.

Shell subovate, last whirl ventricose; aperture more than half the length of the shell, greatly expanded.

Gulnaria of Leach corresponds to this subgenus, but does not have priority. Klein describes a "Radix Bryoniæ" as a genus (?) at an earlier date than Montfort published, but I do not acknowledge him as authority. He did not use the Linnæan system of nomenclature. H. & A. Adams use Klein's name *Neritostoma*, but his description and figure refer rather to *Succinea*, which would prevent the use of the name, even if Klein were authority.

Limnæa ampla, MIGHELS.—Shell large, much inflated, suboval, rather thin, composed of five convex whirls, prominently shouldered at the upper part; epidermis of an obscure olivaceous green color; lines of accretion very fine and compact; transverse lines obscure, appearing serriform under a magnifier, giving the surface the appearance of very delicate lace work; suture deep, and in one specimen subcanaliculate; 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; within it is of a light yellowish fawn color, with an obscure purplish zone, one line in breadth, and about two lines within the aperture. Length 1.3, breadth 1, height .8 inches. Divergence of the spire very variable.

Fig. 34.

Limnæa ampla.

Second Eagle Lake, Maine, N. lat. 47°.

This extraordinary and beautiful species was discovered by Mr. Alexander W. Longfellow, civil engineer, while engaged with other gentlemen of the scientific corps in the exploration and survey of the northeastern boundary, in the summer of 1842. He informs me they were very abundant on the shore of the lake, but he had no means of preserving any more than four specimens, all of which are in my collection. No two of

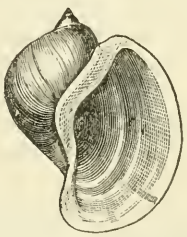
the specimens are exactly alike; but notwithstanding this and the remarkable difference between those represented in the plate, I doubt not they are specifically the same. It is allied to *L. decollata*, Nobis, but it is readily distinguished from that shell by its amplitude, by a proportionately larger penultimate whirl, by the reflected labrum, by a much broader labium, and by an open umbilicus, which is always entirely closed in *L. decollata*. I regard that represented by fig. *a* as the prevailing type of the species. Fig. *b* is a little shorter, and rather more tumid; fig. *c* represents a distorted specimen. (*Mighels.*)

Limnæa ampla, MIGHELS, Bost. Journ. N. H. IV, 347, pl. xvi, f 1, *a*, *b*, *c* (Apr. 1843); Proc. I, 129 (Oct. 1843), not of HARTMANN.[1]—WHITEAVES, Can. Nat. (Apr. 1863), VIII, 112, f. 11.

This is a well-marked species, not easily confounded with any other. The description and Fig. 34 are copied from Mighels. Since their publication, the species seems to have been entirely unnoticed till Mr. Kennicott found it at Fort Simpson.

The European species most nearly related to *L. ampla* is *L. auricularia*. So strong is the resemblance between some forms of the two that their identity is almost suggested. I have, therefore, copied Moquin-Tandon's figure of *L. auricularia*.

Fig. 35.



Limnæa auricularia.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
..	..	British America.	Kennicott.	.....
9283	50+	Isle La Crosse.	"	.....

Limnæa decollata, MIGHELS.—Shell very ventricose, rather thick, subovate or subrotund, in outline an irregular rhomboid; epidermis of an olivaceous green color, rather thin, deciduous; whirls 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 whirl sparse, interrupted, sometimes obsolete; body whirl 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 .6, breadth .5, height .4 inch.

Fig. 36.

Limnæa decollata.

[1] *Gulnaria ampla*, Hartmann, 1842, is referred by Reeve to *L. auricularia*. Should it prove a distinct species, our shell might be called *L. mighelsi*.

Animal dingy mouse-color, with a slight tinge of purple, covered with numerous microscopic, elongated white spots on every visible part of the surface, including the mouth and tentacula; foot of a chocolate color, rather broad, length rather greater than the aperture; habits sluggish. Cabinets of the Bost. Soc. N. H., Dr. Gould, S. S. Haldeman, J. G. Anthony, J. W. Mighels, and C. B. Adams.

Unity, Maine, discovered by Dr. Milliken of that town, to whom we are indebted for specimens.

This odd but interesting shell is readily recognized by its rhomboidal aspect, wide aperture, and rather rough and distorted appearance. It is allied to *L. catascopium*, Say, but is distinct from that shell by having less whirls by two, and a much shorter spire; by being wider, and its divergence greater by more than thirty degrees. By some it has been supposed to be identical with *L. emarginata*, Say. This is impossible. *L. emarginata* is much more cylindrical, the divergence of its spire is scarcely half as great as that of our shell; it is much thinner, and has at least two more volutions. Our shell is also destitute of the "deep emargination" which distinguishes *L. emarginata*. (*Mighels & Adams.*)

Limnæa decollata, Mighels, Proc. Bost. Soc. I, 49 (1841); Bost. Journ. IV, 4–5, 336, pl. iv, f. 13 (and Adams) (1842).

Limnæa catascopium, Haldeman, part, Mon. 52, pl. xiv, f. 1–3 (1842).

Limnæus decollatus, Küster in Ch. ed. 2, 45, pl. viii, f. 11–14.

Fig. 37.

Limnæa decollata.

Found around Lake of the Woods, in Maine and Connecticut.

Haldeman and DeKay refer this species to *L. catascopium*. I have given the original description and figure above. No. 9132, presented by Prof. Haldeman, were by him received directly from Mighels. One is figured in Fig. 37.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8300	9	Lake of the Woods.	R. Kennicott.	.....
8481	1	Maine.	W. G. Binney.	Cabinet series.
9132	6	"	Haldeman.	From Mighels.

Limnæa columella, Say.—Shell thin, fragile, horn-color; whirls four, longitudinally wrinkled. Spire prominent, acute. Suture not much impressed. Aperture dilated, ovate. Columella much narrowed near the base, so that the view may be extended from the base almost to the interior apex of the shell. Length $\frac{7}{10}$ of an inch nearly, of the spire $\frac{1}{4}$ inch.

Inhabits stagnant waters and miry places. Collection of the Academy.

Animal aquatic, base not so long as the aperture; dusky, with small

whitish spots; tentacula broad, pyramidal, compressed; eyes small, black, placed at the inner base of the tentacula.

This species is allied to *L. catascopium* of the American edition of Nicholson's Encyclopedia, but the revolution of the whirls is more oblique, the shell thinner, the aperture much more dilated, and the columella differently formed. For several specimens of this shell I am indebted to Mr. Titian Peale.

Fig. 38.

Limnæa columella.

Var. *a*. Small, black. From Cold Water Creek of the Missouri. This is most probably a distinct species; we obtained but a single specimen of it. (*Say.*)

Limnæa columella, Say, Journ. Acad. Nat. Sc. Phila. I, 14 (1817); II, 167 (1821).—Nich. Enc. 3d ed. (1819); Binney's ed. 60, 56.—Haldeman, Mon. 38, pl. xii (1842).—Gould, Inv. of Mass. 215, f. 144, 216, f. 145 (1841).—DeKay, N. Y. Moll. 72, pl. iv, f. 75 (1843).—Potiez et Michaud, Gal. 1, 216, pl. xxii, f. 5, 6.—Anon. Can. Natural. II, 197, fig. (1857).

Limneus columella, Küster in Ch. ed. 2, 44, pl. viii, f. 3–5.

Limnæa chalybea, Gould, Am. Journ. Sc. [1], XXXVIII, 196 (1840); Otia, 180.

Limnæa macrostoma, Say, Journ. Acad. Nat. Sc. II, 170 (1821); Binney's ed. 67.—Gould, Inv. 217, f. 148 (1841).—Anon. Can. Nat. II, 198, fig. (1857).

Limneus macrostomus, Küster in Ch. ed. 2, 43, pl. viii, f. 1, 2.

Limnæa acuminata, Adams, Am. Journ. Sc. [1], XXXIX, 374 (1840).

Limnæa navicula, Valenciennes, Rec. d'Obs. II, 251 (1833).

Limnæa strigosa, Lea, Proc. Am. Phil. Soc. II, 33 (1841); Trans. IX, 12 (1844); Obs. IV, 12.

Limnæa coarctata, Lea, Proc. Am. Phil. Soc. II, 33 (1841); Trans. IX, 11 (1844); Obs. IV, 11.

Limnæa casta, Lea, Proc. Am. Phil. Soc. II, 33 (1841); Trans. IX, 11 (1844); Obs. IV, 11.

Limnæa columellaris, Adams, Sill. Journ. [1], XXXVI, 392, absq. descr.

Limnæa succiniformis, Adams MS. teste Haldeman.

This species has been found from New England and Lake Superior to Georgia. Its wide range and variable form has caused its being described under several names, which are mentioned in the synonymy and treated at length below. Mr. Say's specimens of *L. columella* are still preserved in the Philadelphia Academy. One is drawn in my figure (Fig. 38). Specimens of his *L. macrostoma* also are there preserved, one being drawn in my figure (Fig. 39). From an examination of it and of the following description, I am led to coincide with Haldeman and DeKay's opinion of its identity with *L. columella*.

Limnæa macrostoma, Say.—Shell suboval; whirls five, body whirl somewhat reticulated; suture not profoundly indented; spire about two-thirds the length of the aperture, acute; aperture much dilated; labrum not thickened on the inner submargin.

Fig. 39.

Limnæa macrostoma.

Inhabits Cayuga Lake. Length ½ inch, and upwards.

Imperfect specimens of this shell were found on the shore of Cayuga Lake, by Mr. A. Jessup, but they are sufficiently entire to exhibit considerable similarity to some varieties of *L. auricularius*, of Europe. It may readily be distinguished from *L. catascopium* by its much more dilated aperture. (*Say.*)

Limnæa acuminata, Adams, seems a synonym of *L. columella*. Haldeman and DeKay so consider it, and Gould refers it to *L. macrostoma*. I have seen no authentic specimen, but give the original description below. It must not be confounded with Brongniart's species of the same name.

Limnæa acuminata, Adams.—Shell fragile, semi-transparent, ovate, with very numerous, revolving, irregular, transverse, parallel striæ; whirls four; spire very short, subacute; last whirl very large; aperture very large, exhibiting the interior of the spire; columella thin, sub-reflected; labium not appressed.

New Bedford.

This differs from *L. columella*, Say, in the much greater proportional size of the last whirl, the breadth of the shell, and the presence of very distinct revolving lines. It resembles *Succinea obliqua*, Say, but the spire is rather less, and no revolving lines are mentioned in the description of that species. The *L. acuminata* has also been found at Horn Pond, in Woburn, Mass., by T. J. Whittemore, Esq. (*Adams.*)

Limnæa chalybea, of Gould, whose description and figure are here copied, is no doubt a form of *L. columella*. It is so stated by him recently (Otia, p. 180), as well as by Haldeman in his Monograph.

Limnæa columella, var. *chalybea*, Gould.—The spire is more pointed, its divergence only about 50°; the aperture is more expanded, and the fold on the inner lip more obvious. It is thin, but not very brittle, ringing like hard-burnt crockery. The last whirl is partially detached from the preceding one, so as to form a thread-like channel at the suture. The enamel rests loosely against the shell, and is wrinkled. The exterior is covered by a bluish-black pigment, not easily removed, and the interior has a steel-blue or black lead color.

Fig. 40.

Limnæa columella, var. *chalybea.*

This shell, which I found two years in succession in a muddy pool in Cambridge, I thought was sufficiently distinct to be regarded as a new species; and I accordingly gave its

characters under the name of *Limnæa chalybea*, in Silliman's Journal, XXXIII, 196. But as it has not been found in any other place, I am now disposed to regard it as a strongly marked local variety of *L. columella*. It is very possibly such a shell to which Mr. Say alludes in the Journ. Ac. Nat. Sc. II, 167, as *L. columella*, var. *a.*, small, black, from Cold Water Creek, Missouri. (*Gould.*)

Limnæa navicula, of Valenciennes, whose description follows, is said to be a form of *L. columella*, by Haldeman and Gould, and also by Ferussac (Bull. Zool. p. 35, 1835) and Küster. I have seen no specimen or figure of it.

Limnæa navicula, Valenciennes.—Shell oval, pointed, subdiaphanous, whirls four, substriate. The last whirl is four times as long as the three others. The aperture is large and gaping, its length equalling two-thirds the shell's length. Shell very thin, slightly transparent. Color grayish-yellow. Length 10 lines.

Hab. Environs of Philadelphia. (*Valenciennes.*)

Finally, an examination of the specimens from which Mr. Lea drew his descriptions of *Limnæa strigosa*, *coarctata*, and *casta*, have convinced me of their identity with *L. columella*. In the case of the second species Haldeman agrees with me, he makes no mention of the others. Mr. Lea's descriptions are copied below, and a figure given of each of the three forms, drawn from his types.

Limnæa strigosa, Lea.—Shell long-oval, somewhat oblique, diaphanous, striate, horn-colored, thin, imperforate; spire short; sutures impressed; whirls five, somewhat convex; aperture ovate.

Hab. Near Cincinnati, Ohio. T. G. Lea. My cabinet and cabinet of T. G. Lea. Diam. .38, length .75 of an inch.

This is a very thin fragile species, somewhat resembling *L. columella*, Say, but may at once be distinguished from that species by its longer spire and less inflated body whirl. It is allied to *L. coarctata*, herein described; differing, however, in being more oblique, and in having the whirls more inflated. The aperture is about three-fourths the length of the shell, and acutely angular above. (*Lea.*)

Fig. 41.

Limnæa strigosa.

Limnæa coarctata, Lea, is also referred to *L. macrostoma*, by Küster, *l. c.* Mr. Lea's description here follows, with a drawing of his original specimen.

Limnæa coarctata, Lea.—Shell fusiform, very thin, obsoletely striate, diaphanous, horn-color, imperforate; spire short, pointed; sutures slightly impressed; whirls four, rather flattened; aperture large, ovate.

Hab. Newport, Rhode Island: Col. Totten, United States Army. My cabinet and cabinet of Col. Totten. Diam. .30, length .55 of an inch.

Fig. 42.

Limnæa coarctata.

This is one of the most delicate and fragile of the genus *Limnæa* which I have seen. It is allied to Mr. Say's *L. columella;* but may at once be distinguished by the compression of the superior part of the body whirl, which causes an acute angle in the superior part of the aperture. Under a rather powerful lens, some of the specimens may be perceived to have very minute revolving striæ. The aperture is two-thirds the length of the shell, and is inflated at the inferior part. The fold of the columella is delicate and incurved. (*Lea.*)

Limnæa casta, Lea.—Shell subfusiform, rather thick, closely striate, yellow, perforate; spire rather elevated, acuminate; sutures impressed; whirls six, convex; aperture large, ovate.

Fig. 43.

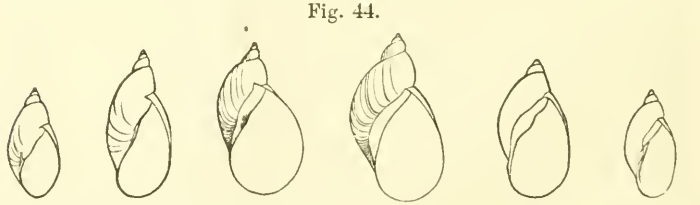
Limnæa casta.

Hab. Poland, Ohio: Dr. Kirtland. My cabinet and cabinets of Dr. Kirtland, and T. G. Lea. Diam. .30, length .58 of an inch.

The columella of this species is remarkably straight, and being reflected, causes the lower part of the aperture to be slightly effuse. The last whirl is wrinkled. The aperture is more than half the length of the shell. It is allied to *L. desidiosa*, Say, but is a smaller species, has the spire more exserted, and a less curved fold. The perforation is very small. Dr. Kirtland kindly sent me many specimens several years since. (*Lea.*)

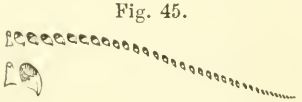
Fig. 44 represents, at one view, the various forms which have been described as distinct species.

Fig. 44.



L. coarctata. *L. casta.* *L. macrostoma.* *L. columella.* *L. chalybea.* *L. strigosa.*

Fig. 45.



Lingual dentition of *L. columella.*

Fig. 45 represents the lingual dentition of the species. There are eighty rows of about seventy teeth each.

Dr. T. R. Ingalls, of Greenwich, N. Y., to whom I am indebted for many specimens of shells and much valuable information, wrote me in 1860 the following curious note regarding *L. columella.* His words are—

"The *L. macrostoma* which I send you requires a note. It comes as near a case of spontaneous generation as anything within my observation. It was found in a little pool about twenty feet in diameter, entirely cut off from streams and fed by a spring. I had for years frequented it for Desmidia, &c., in which it was very rich. One season, and one only, appeared these *Limnææ*, which do not occur elsewhere, as far as I now know, within twenty miles. The pond dried up that season and destroyed the locality."

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8295	3	Ohio.	.....	.....
8296	7	St. Simon's Island, Ga.	.....	.....
8297	1	Marietta. O.	W. Holden.	.....
8298	9	South Carolina.	W. Stimpson.	.....
8299	5	.....	W. G. Binney.	Var. *chalybea*, Gld.
8482	2	.....	"	Cabinet series.
9139	12	St. Simon's, Ga.	Postell.	.....
8979		San Felipe Spr.	Capt. Beale.	.....[by Say.
8522	1	.....	Ac. N. Sc. Phila.	Marked *L. macrostoma strigosa*, teste Lea.
9251	9	Massachusetts.	.....	

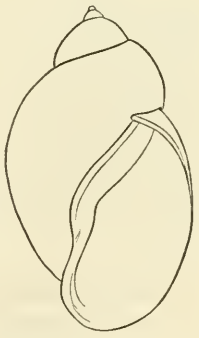
Subgenus **BULIMNEA**, Hald.

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

Limnæa megasoma, Say.—Large, dilated suboval; spire short, rapidly diminishing, acute; whirls about five, rounded, obtusely wrinkled across; body whirl large, the wrinkles very obvious, suture deeply impressed; aperture subovate, much longer than the spire, within chestnut-brown; columella white. Length more than one and six-tenths of an inch; greatest diameter one inch.

This remarkably large and fine species was found in Bois Blanc Lake, Northwest Territory, by Dr. Bigsby, to whom I am indebted for specimens. The color is brownish, sometimes lineated across the body whirl with dull greenish and pale ochraceous; and the chestnut-brown color of the interior of the shell, combined with its large dimensions, distinguish this species from all others yet discovered in this country. (*Say.*)

Fig. 46.



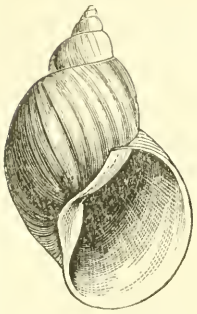
Limnæa megasoma.

Limnæus megasomus, Say, Long's Exp. II, 263, pl. xv, f. 10 (1824); Binney's ed. 129, pl. lxxiv, f. 10.—Küster in Ch. ed. 2, 36, pl. vi, f. 20, 21.

Limnæa megasoma, Haldeman, Mon. 13, pl. iii, f. 1–3 (1841).—Adams, Shells of Vermont; Thoms. Vt. 153, excl. fig., pamphlet, p. 3 (1842).—DeKay, N. Y. Moll. 70, pl. iv, f. 70 (1843).

Bulimnea megasoma, Chenu, Man. de Conch. II, 480, f. 3543.

Fig. 47.



Limnæa megasoma.

This is a northern species, ranging from Lake Champlain to Michigan. The shell, by which it is commonly represented in collections, corresponds perfectly with Mr. Say's types in the Philadelphia Academy. His description and figure are copied above (Fig. 46).

Prof. Adams' figure does not represent this species.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8253	1	Burlington, Vt.	.....	.....
8254	6	Lake Champlain.	W. Stimpson.	.....
8487	2	"	"	Cabinet series.
9249	4	Lake Superior.	Dr. J. S. Newberry.	.....

Subgenus **LIMNOPHYSA**, Fitz.

Shell ovate-oblong; spire conic, about as long as the aperture, whirls rounded; outer lip not spreading.

The date of publication of *Limnophysa* is 1833—*Limnæa palustris* being the type. I find this prior to all other names for the section. *Stagnicola*, Leach, was first described in 1840, in Gray's edition of Turton, Leach's work was not then printed, and the edition of Turton bearing date 1831 gives no description, merely referring in the synonymy of several species to Leach's manuscript. *Galba*, Schrank, antedates *Limnophysa*, but is placed in the synonymy by Herrmannsen, no doubt for valid reasons.

Limnæa reflexa, Say.—Shell fragile, very much elongated, narrow, honey-yellow, tinctured with brownish, translucent, slightly reflected from the middle; volutions six, oblique, wrinkled transversely; spire more than one and a half times the length of the aperture, acute, two or three terminal whirls vitreous, body whirl very much dilated; aperture rather narrow; labrum with a pale margin, and dusky red or blackish sub-margin.

Inhabits Lakes Erie and Superior. Total length $\frac{13}{10}$,[1] of the aperture $\frac{11}{20}$ of an inch.

This shell is remarkable for its narrow and elongated form, and for the consequent very oblique revolution of the whirls. When viewed in profile it has a slightly reflected appearance. It was kindly sent to me for examination by my friends Messrs. S. B. Collins and D. H. Barnes, of New York, and was found in Lake Superior by Mr. Schoolcraft. I recollect to have seen a specimen two or three years since brought from Lake Erie by James Griffiths. It is proportionally longer than *elongatus*. (*Say.*)

Fig. 48.

Limnæa reflexa.

Limneus reflexus, Say, Journ. Acad. Nat. Sc. Phil. II, 167 (1821); Am. Conch. IV, pl. xxxi, f. 2 (1832); Binney's ed. 65, 188, pl. xxxi, f. 2; ed. Chenu, 44, pl. vii, f. 4. —Küster in Ch. ed. 2, 41, pl. vii, f. 11, 12.

Limnæa reflexa, Haldeman, Mon. 26, pl. viii (1842).—DeKay, N. Y. Moll. 71, pl. iv, f. 65, 72 (1843).

Limneus elongatus, Say, Journ. Ac. Nat. Sc. Phil. II, 167 (1821); Long's Exp. II, 263; Binney's ed. 65, 130; ed. Chenu, 43, pl. vii, f. 5.

Limneus umbrosus, Say, Am. Conch. IV, pl. xxxi, f. 2 (1832); Binney's ed. 187, pl. xxxi, f. 2.—Haldeman, Mon. 24, pl. vii (1842).—DeKay, N. Y. Moll. 68, pl. iv, f. 76 (1843).—Küster in Ch. ed. 2, 41, pl. vii, f. 13–16.

Limnæa exilis, Lea, Tr. Am. Phil. Soc. V, 114, pl. xix, f. 82 (1837); Obs. I, 226.—Küster (*Limnæus*) in Ch. ed. 2, 40, pl. vii, f. 9.

Limnæus palustris, var. *distortus*, Rossmassler (1835), Icon. I, 97, pl. ii, f. 52.

Limnophysa reflexa, Chenu, Man. de Conch. II, 480, f. 3544.

This species has been observed through the northern tier of States, from New York to the Pacific, and in Canada. It extends more to the southward in the western portions of its area, having been found in Kansas and Utah, and in the Columbia and Sacramento Rivers.

I have given above a copy of Mr. Say's description of this species, and a fac-simile (Fig. 48) of the outline of one of his figures. It is a well-known shell, found in great numbers, and common in collections. It is subject to much variation, as shown by the large suite in the collection. Three forms have been described as distinct species, and are treated at length below. It is also readily confounded with *Limnæa fragilis*, so as indeed almost to warrant the conclusion of Forbes & Hanley that "the

[1] Probably $1\frac{3}{10}$ inch.

reflexa, *umbrosa*, and *elodes* of Say, which form apparently but one species, are scarcely distinguishable from this variable shell (*palustris*)."

Mr. Say's type of *Limnæa umbrosa* is still preserved in the Philadelphia Academy. My Figure 49 is a fac-simile of the outline of one of his, and a copy of his description here follows. The name *umbrosa* was substituted by Mr. Say for the pre-occupied *elongatus*. The shell is considered distinct by Haldeman and DeKay, doubtfully so in Adams' Shells of Vermont.

Limneus elongatus.—Shell horn-color, tinged with reddish-brown; spire elongated, tapering, acute; whirls six or seven, slightly convex, wrinkled across; body whirl, measured at the back, more than half the total length; suture moderately indented; aperture less than half the length of the shell; labium with calcareous deposit. Length one and three-tenths inch.

Fig. 49.

Limnæa umbrosa.

Inhabits, in considerable numbers, the ponds and tranquil waters of the upper Missouri. It is very distinct from *L. catascopium*, by the much greater proportional length of the spire. (*Say* in J. A. N. S.). Rainy Lake and Seine River f Upper Canada.

I am under the necessity of changing the name which I first applied to this shell, that of *elongatus* being pre-occupied by Draparnaud for a very different species. The fold of the columella is much less profound than that of *L. palustris*, Lin., which it much resembles. (*Say* in Am. Conch.)

Limnæa plebeia, Gould, is quoted doubtfully as a synonym of *L. umbrosus*, by Adams (Middlebury Shells, and Sill. Journ. [1], XL, 268). I refer it, however, to *L. palustris*, as that species is found in Massachusetts, while *umbrosa* is not. Gould mentions *plebeia* by name only in the Catalogue of Massachusetts Shells.

My opinion of the identity of *Limnæa exilis* with *L. reflexa* is based upon an examination of Mr. Lea's original specimen. His description and figure here follow. Haldeman and DeKay place *exilis* in the synonymy of *reflexa*.

Limnæa exilis.—Shell attenuated, very thin, longitudinally striate; whirls seven, plano-convex, columella reflected; aperture ovate-oblong.

Ohio. My cabinet. Diam. .4, length 1.5 inch.

This is, perhaps, the most attenuated *Limnæa* yet observed in this country. It approaches most to the *reflexus*, Say, but is more elongate than that species. The most remarkable character of the *exilis* is, per-

haps, the reflection of its labium, which is not laid on the body of the whirl. Where it joins above with the labrum, the angle is quite acute, and is separated from the body whirl. The specimen figured was not taken alive, and the epidermis being destroyed, the description and representation are partially defective. The aperture is about two-fifths the length of the shell. (*Lea.*)

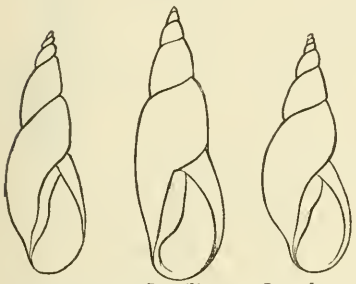
Fig. 50.

Limnæa exilis

I was at first inclined to place *Limnæa haydeni* in the synonymy of this species. It appears to be distinct after more careful study of the specimens in the collection.

Fig. 51 gives, at one view, the various forms which I have considered synonyms of *L. reflexa.*

Fig. 51.



L. reflexa. *L. exilis.* *L. urnbrosa.*

Limnæus palustris, var. *distortus*, of Rossmassler, is a form of this species, as shown by his figure, of which a fac-simile is here given (Fig. 52).

Fig. 52.

L. palustris, var. *distortus*

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8224	8	Milwaukee, Wis.	I. A. Lapham.	.....
8225	4	Big Sioux.	.....	.....
8226	16	Illinois.	.....	.....
8227	7	.....	.....	.....
8228	8	Goose Island, Mich.	.....	.....
8229	26	Big Sioux.	.....	.....
8230	8	Milwaukee Wis.	I. A. Lapham.	.....
8231	20	.....	.....	.....
8232	1	St. Clair River.	.....	.....
8233	3	.....	.....	.....
8234	7	Farwell's Mills, Madi-	Prof. S. F. Baird.	.....
8235	1	Illinois. [son, Wis.	.....	.....
8236	7	Prairie Lke, n. Red Riv.	R. Kennicott.	.....
8237	2	Toledo, O.	F. A. Bossard.	.....
8238	3	Ohio.	Dr. J. Lewis.	.....
8239	11	Goose Island, Mich.	.....	.....
8240	8	Milwaukee, Wis.	.....	.....
8241	4	Illinois.	Dr. J. Lewis.	.....
8242	13	Grindstone Creek.	.....	.....
8243	15	Ft. Pelice.	.....	.....
8491	1	Aztalan, Wis.	Prof. S. F. Baird.	Cabinet series.
8319	6	.....	.....	.....
8521	5	.....	.....	Cab. series.
3523	3	Pacific Coast.	.....	"
8734	2	San Francisco.	Rowell.	.....
9066	200+	Milwaukee.	Lewis.	.....
9139	20+	.....	"	.....

Limnæa attenuata. Say.—Shell elongate turreted, somewhat translucent; spire slender, attenuated, acute; whirls six or seven, with but a very slight convexity; wrinkles more distinct towards the aperture; body whirl, measured at the back, obviously less than half the total length. Length one inch.

Fig. 53.

Limnæa attenuata.

Inhabits Mexico.

This species abounds in ditches and ponds in the vicinity of the capital. It is more nearly related to *L. reflexus*, nob., than to any other known species of North America; but it is only necessary to compare the two in order to perceive a wide difference between them. The present is smaller and proportionally more slender, and the spire is more attenuated. (*Say.*)

Limnæa attenuata, Say, New Harm. Diss. II, 244 (1829); Binney's ed. 148; Descr. 23.—DeKay, N. Y. Moll. 75 (1843).—Haldeman, Mon. 28, pl. ix, f. 1–5 (1842).—Küster (*Limnæus*), Chemn. ed. 2, 39, pl. vii, f. 8.

Limnæus subulatus, Dunker in Küster, Ch. ed. 2, 24, pl. iv, f. 24.

Figure 53 is drawn from an authentic specimen of Mr. Say. His description is given above.

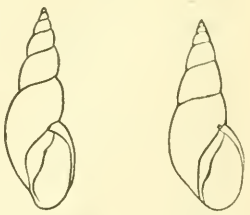
In describing the habitat of *Planorbis tenuis*, in Chemnitz, ed. 2, *Limnæus subulatus* is mentioned as common among graves near Mexico. There is also a *L. subulata*, Kickx, mentioned in Dupuy's Mollusques de la France, p. 463. But the species referred to is, I suppose, the one described in Küster's ed. 2 of Chemnitz, Limnæa, p. 24, pl. iv, f. 24. As the last livraison devoted to Limnæa, which has reached this country, contains only a portion of the description of the species, I cannot say what locality is given by Küster for the shell. The figure corresponds with *Limnæa attenuata*, Say. It is copied in Figure 54. A translation of the description here follows:—

Shell imperforate, subulate-turreted, solid, striated, reddish horn-color; spire elongate, subulate, acuminate; whirls seven, flattened; aperture semioval, yellowish-red, sanguineous at the base; peristome straight, sharp, oblique, with a distinct columellar fold. (*Dunker.*)

Fig. 54.

Limnæa subulata.

Fig. 55.



L. attenuata. *L. subulata.*

Since writing the above the succeeding part of Chemnitz, ed. 2, having arrived, I find the locality to be Mexico, at Zimapan and Lake of Mexico.

Fig. 55 gives, at one view, the two forms which I have considered synonymous.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8294	7	City of Mexico.	.....	.....
8483	5	"	. ....	Cabinet series.

Limnæa sumassi, Baird. — Shell elongate, attenuated, horn-colored, fragile; whirls six, the last twice the size of the remainder; aperture moderate; columella strongly plicate; external surface with microscopic, crowded, very minute decussations. Length of largest $1\frac{1}{6}$, breadth $\frac{1}{2}$ inch.

Fig. 56.

Limnæa sumassi.

Hab. Sumass Prairie, Fraser River, British Columbia.

Fig. 57.

Limnæa sumassi.

This species of *Limnæa* approaches *L. elodes*, Say, but is more elongated, more fragile, and has the columella very strongly plicated. The surface of the shell, when seen under a lens of moderate power, is finely decussately striated. It is of a horny color, and is of an elongated shape. (*Baird.*)

Limnæa sumassi, Baird, Proc. Zool. Soc. London, 1863, p. 68.

This species was collected by the British Boundary Commission. Members of the American Commission also collected the specimens in the Smithsonian collection, which show the species to be extremely variable. I have copied above the original description and two figures from the advance plates of the British Report, kindly furnished by Mr. Carpenter.

Fig. 58.

Limnæa sumassi?

A curious specimen, from Ft. Colville (Northwest Boundary Survey), is figured in Fig. 58. It may be referable to this species.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9320	30	E. of Ft. Colville, W. T.	N. W. Boundary Surv.	.....

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

Fig. 59.

Limnæa haydeni.

Yellowstone and Big Sioux: Dr. Hayden. (*Lea.*)

Limnæa haydeni, Lea, Proc. Acad. Nat. Sc. Phila. 1858, 166.

I was at first inclined to place this species in the synonymy of *Limnæa reflexa.* Upon more careful examination of the specimens collected by Dr. Hayden (one of which is here figured), I am satisfied of its being distinct. Its rounded whirls and strongly plicate columella are its chief characteristics.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8250	18	Yellowstone River.	.....	Original lot named by
8251	27	Ruby Valley. [River.	Capt. J. H. Simpson, Army of Utah.	[I. Lea. "Swamps."
8252	8	Mo. of the Yellowstone	.....	"In alluvial."
8255	4	Big Sioux.	.....	Named by I. Lea.
8523	9	30 m. w. of Ft. Kearney.	.....	.....
8270	28	Bet. Pike L. & Ft. Union.	Gov. J. J. Stevens.	.....
8485	2	Mo. of Yellowstone.	.....	Cabinet series.

Limnæa palustris, Müll.—Shell oblong conic, gradually acuminated, reticulate with transverse lines and longitudinal wrinkles; whirls rather more than six; spire acutely terminated; suture moderately impressed; aperture shorter than the spire; labrum, inner sub-margin, reddish obscure; labium, calcareous deposit rather copious, not appressed at base, but leaving a linear umbilical aperture; body whirl on the back longer than the spire.

Fig. 60.

Limnæa elodes.

Inhabits Canandaigua Lake.

Var. *a.* Whirls simply wrinkled across, the calcareous deposit at base appressed to the surface of the whirl.

This species was found by Mr. A. Jessup; it bears the most striking resemblance to *L. palustris.* The variety was found by the same enterprising mineralogist at Morristown, New Jersey. I have subsequently received specimens from Mr. S. B. Collins, of New York, who procured them in a marsh near the Saratoga Springs. (*Say*, J. A. N. S.) The fold of the columella is much more profound than that of *umbrosus.* (*Say*, Am. Conch.)

Helix palustris, Müller, &c., Rackett, Tr. Linn. Soc. XIII, 42 (1822).

Limnæus elodes, Say, Journ. Ac. Nat. Sc. Phil. II, 169 (1821); Am. Conch. IV, pl. xxxi, f. 3 (1832); Binney's ed. 66, 188, pl. xxxi, f. 3; ed. Chenu, 44, pl. viii, f. 3.—Küster in Ch. ed. 2, 42, pl. vii, f. 17–21.

Limnæa elodes, Gould, Inv. of Mass. 221, f. 146, 147 (1841).—Adams,

Shells of Vermont, in Thoms. Hist. 153 (1842).—Anonymous, Can. Nat. II, 199, fig. (1857).

Limnæa fragilis (not of Linnæus),[1] Haldeman, Mon. 20, pl. vi, xv, f. 1 (1842); 53, pl. xiv, f. 1—DeKay, N. Y. Moll. 68, pl. iv, f. 68 (1843).

Limnæa palustris, Müller (*Buccinum*), &c.—Sheppard (1829), Tr. Lit. Hist. Soc. Quebec, I, 196.

Limnæa nuttalliana, Lea, Pr. A. P. S. II, 33 (1841); Tr. Am. Phil. Soc. IX, 9 (1844) · Obs. II, 9.—Küster (*Limnæus*) in Ch. ed. 2, 38, pl. vii, f. 5.

Limnæa plebeia, Gould? (see below).

Limnæa expansa, Haldeman, Mon. 29, pl. ix, f. 6–8 (1842); Suppl. to part I, p. 3 (1840).—DeKay, N. Y. Moll. 75, pl. xxxvi, f. 348 (1843). —Küster (*Limnæus*) in Chemn. ed. 2, 39, pl. vii, f. 6, 7.

Ranging from New England, through Pennsylvania and Kansas, to California and Oregon. Very numerous in British America, reaching a high latitude, as shown by specimens from Hudson's Bay and Fort Resolution.

Mr. Say suggests the identity of *L. elodes* with the European *L. palustris*. I have no doubt of it, the species being one of the circumpolar forms common to the three continents. I have given the original description above, and Fig. 60 is a fac-simile of one of Say's. It is a very variable species, sometimes scarcely to be distinguished from *L. reflexa*, as remarked under that species (p. 39). *Limnæa plebeia* is also referred to under *L. reflexa* (p. 40). Dr. James Lewis unites *L. catascopium* and *L. emarginata* to *L. elodes*.

Fig. 61.

Limnæa palustris.

Limnæa nuttalliana appears to me a form of this species. My opinion is based on a careful examination of specimens so labelled by Mr. Lea. The original description here follows, and a drawing of the original specimen. So little does this figure (62) correspond with *L. palustris* that, judging by it alone, I should be inclined to reverse my opinion of the identity of *nuttalliana* with *palustris*. It is one of the points to which attention must be directed. No. 8256 and 8257 were labelled *L. nuttalliana* by Mr. Lea. One of them is here figured (Fig. 61). No. 8318 and 8474 are also this form.

Limnæa nuttalliana.—Shell ovately conical, rather thin, striate, subdiaphanous, pale brown, imperforate; spire rather short; apex red;

[1] *L. fragilis*, of Linnæus, is synonymous with *L. stagnalis*.

sutures impressed; whirls six, convex; aperture ovate, inflated, banded within.

Fig. 62.

Limnæa nuttalliana.

Oregon. My cabinet and cabinets of Prof. Nuttall and Dr. Jay. Diam. .50, length .95 inch.

A fine, rather robust species, rather resembling *L. elodes*, Say, but shorter and more inflated, and having a larger and more curved fold. The aperture is rather more than one-half the length of the shell, and is retuse at the lower part. Under the lens may be observed very minute revolving striæ. The band within the aperture is removed from the edge of the lip, and is broad and brown. The lip is not reflected. (*Lea.*)

A recent visit to Prof. Haldeman has enabled me to examine the two original specimens, the only ones known, from which were drawn the description of *Limnæa expansa*. Believing them accidental variations only, I add them to the synonymy of *Limnæa elodes*. The Oregon specimen, 8573 of the collection, most nearly resembles this form. A fac-simile of Haldeman's figure and a copy of his description here follow :—

Limnæa expansa.—Shell short, smooth, translucent, and fragile; body whirl inflated; spire as long as the aperture, and rapidly attenuated to an acute apex; whirls five, somewhat flattened; suture shallow, but very distinct, aperture effuse; fold on the columella deep and distinct. Color brownish ochre-yellow.

Fig. 63.

Limnæa expansa.

Found only in Vermont.

I owe the opportunity to describe this new species to Dr. Gould, who gave me specimens, and the information that they are from Vermont. It differs from *L. elodes* in having a polished surface, expanded aperture, obsolete lines of growth, translucency, and a deeper fold upon the columella. It cannot be confounded with any other species. (*Haldeman.*)

It must constantly be borne in mind that I cannot pretend at this time to speak very positively in regard to the synonymy of the North American Limnæidæ. My conclusions are the best I can arrive at with my present material. It is a point to be decided in future whether *L. nuttalliana* and *L. expansa* are synonyms of *L. palustris*. The forms referred to this species are shown at one view in Fig. 64.

Fig. 64.

L. elodes. *L. expansa.* *L. nuttalliana.*

Fig. 65 will be of interest, as it is copied from Moquin-Tandon's figure of *Limnæa palustris* of France.

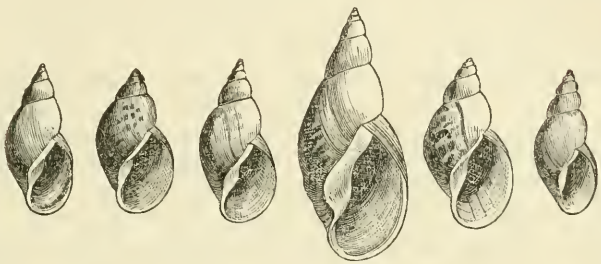
Reeve points out the strong resemblance, if not identity, of the European and American shells.

Fig. 66 represents some of the forms of this variable species which are represented in the Smithsonian collection.

Fig. 65.

Limnæa palustris.

Fig. 66.



Varieties of *Limnæa palustris.*

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8123	8	Monterey, Cal.	.....	.....
8123	6	Interior Oregon.	Com. Wilkes.	.....
8269	6	Yellowstone River.	Col. Vaughan.	.....
8271	8	Mohawk, N Y. [Wis.	Dr. J. Lewis.	.....
8272	8	Oskosh, L. Winnebago,	A. C. Barry.	.....
8273	5	Fairhaven, Vt.	Dr. J. Lewis.	.....
8274	4	Marietta, O.	W. Holden?	.....
8275	2	Lake Winnipeg.	R. Kennicott.	.....
8276	13	Scarboro', Me. [wego.	Dr. J. Lewis.	.....
8277	1	Four Mile Creek, Os-	.....	.....
8278	6	Roxbury, Mass.	Dr. J. Lewis.	.....
8279	6	Nimahaw River, K. T.	Wm. T. Magraw.	.....
8280	10	Summer Lake, O.	.....	.....
8281	16	Near Chimney River.	Wm. T. Magraw.	"Swamps."
8282	9	Mohawk, N. Y.	Dr. J. Lewis.	.....
8283	14	Grand Rapids, Mich.	..... [land.	.....
8284	20	Sing Sing, N. Y.	Rev. R. J W. Buck-	.....
8285	14	Mohawk, N Y.	Dr J. Lewis.	.....
8286	2	Lake Winnipeg.	R. Kennicott.	.....
8287	2	Milwaukee, Wis.	J. A. Lapham.	.....
8288	6	Port Huron, Mich.	Prof. S. F. Baird.	"*umbrosa*," I. Lea.
8289	14	Grindstone Creek.	.....	.....
8290	2	Lake of the Woods.	R. Kennicott.	.....
8291	23	Grindstone Creek.	.....	.....
8464	50	Platte Riv. at Ft. Kearney, Neb. [get Sound	Capt. J. H. Simpson.	[hol. With animal in alco-
8467	28	Chilencynck Depot, Pu-	A. Campbell.	" "
8477	5	Grand Rapids, Mich.	.....	.....
8568	2	Pacific Coast.	.....	.....
8735	12+	San Francisco	Rowell.	In alcohol.
8736	4	Clear Lake, Cal.	Dr. Veatch.	.....
8739	2	San Francisco.	Rowell.	.....
8953	6	Ft. Simpson, Br. Am.	R. Kennicott.	.....
8573	1	Oregon.	.....	(*expansa*, Hald?)
8958	..	Ft. Resolution.	R. Kennicott.	.....
9072	20+	"	"	.....
9073	20+	"	"	.....
9136	20+	"	"	.....

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9138	10	Mohawk, N. Y.	Dr. Lewis.	.....
9176	30+	Vermont.	J. E. Chittenden.	.....
9180	10	Lynn, Mass.	Dr. Prescott.	.....
8256	16	Apple Creek, lat. 47°.	.....	*nuttalliana*, teste Lea.
8257	4	Big Sioux.	.....	" "
8318	50	Mo. of the Yellowstone.	.....	" "
8474	1	Big Sioux.	.....	" "
9286	1	Otter Tail Creek, Min.	.....	.....
9288	15	Upper Mackenzie.	.....	.....
9291	11	Great Slave Lake.	.....	.....
9237	5	Wright's L., Cal.	.....	*nuttalliana*, teste Lea.
9239	4	Klamath Marsh, O.	Dr. J. S. Newberry.	" "
9246	1	Rhett L., Cal.	.....	" "
9241	8	Benicia. [pine.	Dr. J. S Newberry.	.....
9289	20	Yukron, mo. of Porcu-	R. Kennicott.	.....

Limnæa proxima, Lea.—Shell acutely conic, rather thin, closely and irregularly striated, horn-colored, minutely perforated; spire sub-elevated, sharpened at the apex; sutures deeply impressed; whirls seven, convex; aperture sub-inflated, sub-elliptical, banded within, columella slightly plicate.

Fig. 67.

Limnæa proxima.

Arroya San Antonio, California: Dr. Trask. (*Lea.*)

Limnæa proxima, Lea, Proc. Ac. Nat. Sc. Phila. VIII, 80 (1856).

The above is Mr. Lea's description. Fig. 67 is drawn from No. 9204 of the collection, determined by him. The rapid enlargement of the whirls in width appears to be the chief characteristic of this species.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9204	4	San Francisco.	Judge Cooper.	Authentic—one fig'd.
9195	..	California.	"	Named by I. Lea.

Limnæa desidiosa, Say.—Shell oblong sub-conic; whirls five, very convex, the fourth and fifth very small, the second rather large, suture deeply indented; aperture equal to or rather longer than the spire; labium, calcareous deposit copious, not perfectly appressed at base, but leaving a very small umbilical aperture.

Fig. 68.

Limnæa desidiosa.

Inhabits Cayuga Lake. Length 7-10 of an inch.[1]

Found by Mr. Augustus Jessup. It is closely allied to *L. elodes*, but the whirls are more convex, one less in number, and the two terminal ones are proportionally smaller; the callus of the labium, also, near its inferior termination, is applied still more closely to the surface of the body whirl. (*Say.*)

Limnæa desidiosa, Say, Journ. A. N. S. II, 169 (1821); Long's Ex. II,

[1] See remarks under *L. humilis*.

263; Am. Conch. VI, pl. l, f. 5; ed. Binn. 66, pl. lv, f. 3.—Adams, Shells of Vermont, 154 (1842).—DeKay, N. Y. Moll. 73, pl. v, f. 78 (1843).—Küster in Ch. ed. 2, 47, pl. viii, f. 22-26 (*Limnæus*).—Gould, Inv. of Mass. 219, f. 150 (1841).—Haldeman, Mon. p. 31, pl. x; p. 48, pl. xiii, f. 16-18 (1842).—Anony. Can. Nat. II, 198, fig. (1857).

Limnæa acuta, Lea, Tr. Am. Phil. Soc. V, 114, pl. xix, f. 81 (1837); Obs. I, 226.

Limnæa obrussa, Say, J. A. N. Sc. V, 123 (1825); Binney's ed. 113.—DeKay, N. Y. Moll. 75 (1843).

Limnæa philadelphica, Lea, Proc. Am. Phil. Soc. II, 32 (1841); Tr. IX, 8 (1844); Obs. IV, 8.

Limnæa fusiformis, Lea, Pr. Am. Phil. Soc. II, 33 (1841); Tr. IX, 10 (1844); Obs. IV, 10.

From New England to Kansas.

An authentic specimen of *L. desidiosa*, in the Academy's collection, is drawn somewhat larger than nature in Fig. 68.

Mr. Haldeman places *L. obrussa* in the synonymy of *L. desidiosa*. Say's description here follows, and a drawing of an authentic specimen from the Academy at Philadelphia.

Limnæa obrussa.—Shell oblong, rather slender, pale yellowish testaceous; whirls five, slightly rounded; apex acute; suture deeply impressed; aperture not dilated, within pure white; columella with the sinus of the fold very obvious (*Lister*, pl. 114, f. 8?). Total length nine-twentieths of an inch; aperture one-fourth; breadth nearly one-fifth.

Fig. 69.

Limnæa obrussa.

All the individuals that have occurred were covered with an earthy slime. They inhabit a small rivulet below the fish-ponds at Harrowgate, the seat of my friend Mr. J. Gilliams. (*Say.*)

The descriptions of *L. philadelphica*, *fusiformis*, and *acuta* here follow, as well as figures of them drawn from Mr. Lea's original specimens, excepting *L. acuta*, which is copied from his original figure. Haldeman and DeKay both place *L. acuta* in the synonymy of *L. desidiosa*. Specimens labelled *L. philadelphica*, by Mr. Lea, are in the Smithsonian collection from the Yellowstone River. Küster, *l. c.*, places *obrussa*, *acuta*, and *philadelphica* in the synonymy.

Haldeman refers doubtfully *L. casta* to this species. It appears to me, however, rather a synonym of *L. columella*.

The name *L. fusiformis* is preoccupied by Sowerby (Min. Conch. II, 155, pl. clxix, 1818).

Limnæa acuta, Lea.—Shell elevated, turreted, thin, smooth, dark-brown; spire attenuate; whirls six, aperture subovate.

Fig. 70.

Limnæa acuta.

Pond four miles north of Philadelphia. Diam. .3, length .7 inch.

This delicate species, though attenuate, is not so much so as the *exilis*, herein described. Its whirls are more convex and the body whirl larger, the aperture being about one-half the length of the shell. Several specimens were found by me, some years since, in a very small pond near the Falls of Schuylkill. Since then this pond has occasionally dried up, and I have not been able to find others. Although there are other ponds near to this, which other species inhabit, I have never been able to discover the *acuta* in any other spot. (*Lea.*)

Limnæa philadelphica, Lea.—Shell ovately-conical, thin, striated, shining, diaphanous, rather golden, imperforate; spire rather elevated; sutures much impressed, whirls five, convex; aperture narrow-elliptical.

Fig. 71.

Limnæa philadelphica.

Hab. River Schuylkill, near Philadelphia. My cabinet and cabinets of P. H. Nicklin, and Dr. Griffith. Diam. .20, length .48 of an inch.

This species is about the size of, and is allied to *plica* and *griffithiana*, herein described, and to *modicella*, Say. It has a more elongated aperture than *griffithiana*, has a smaller fold than *plica*, and is higher in the spire than *modicella*. The aperture is about half the length of the shell. I procured many specimens west of Philadelphia. Dr. Griffith informs me that he found them south of the city. (*Lea.*)

Limnæa fusiformis, Lea.—Shell fusiform, rather thick, closely striate, pale yellow, imperforate; spire rather short; sutures slightly impressed; whirls six, flattened; aperture narrow-elliptical.

Fig. 72.

Limnæa fusiformis.

Hab. Niagara River, Lewistown, New York: Tobias Wagner. My cabinet, and cabinets of P. H. Nicklin, and Tobias Wagner. Diam. .35, length .60 of an inch.

Among a number of interesting shells collected by T. Wagner, during a long journey in the interior of our country, were several specimens of this species, which has not been, I believe, before noticed. It is found with, and is somewhat allied to, *L. desidiosa*, Say. It differs in being more fusiform, having a larger aperture, and flatter whirls, and in being imperforate. It is about the size of, and resembles, *L. casta*, herein described. It differs in being less elevated in the spire, in the whirls being more flattened, in having a distinct and curved fold, and in being imperforate. The aperture is nearly two-thirds the length of the shell. The last two whirls are disposed to be wrinkled. (*Lea.*)

Fig. 73.

L. desidiosa. *L. philadelphica.* *L. acuta.* *L. obrussa.* *L. fusiformis.*

Fig. 73 gives, at one view, the forms which I have referred to the synonymy of this species.

Fig. 74 represents the European representative of *L. desidiosa.* It is copied from Moquin-Tandon's figure of *L. truncatula.*

Fig. 74.

Limnæa truncatula.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8310	4	Minnesota.	I. A. Lapham.	.....
8311	11	Grand Rapids, Mich.	Dr. J. Lewis.	.....
8312	8	" "	"	.....
8313	34	Apple Creek, lat. 47°.	.....	.....
8314	4	Loup Fork.	.....	..... [sil.
8315	8	.....	Dr. J. Lewis.	Calcareous tufa. Fos-
8316	36	Mohawk, N. Y.	"	.....
8317	29	Westbrook, Me.	"	.....
8470	25	Mohawk, N. Y.	"	Alcohol.
8476	1	.....	W. G. Binney.	.....
8526	4	Yellowstone River.	Dr. F. V. Hayden.	Cabinet series. [Lea.
8951	2	.....	.....	*philadelphica*, teste

Limnæa emarginata, Say.—Shell rather thin, translucent; volutions four, very convex; body whirl large; suture deeply impressed, spire somewhat eroded; mouth two-thirds of the length of the shell. Length nearly four-fifths of an inch; of the mouth, half an inch.

Fig. 75.

Limnæa emarginata.

Inhabits lakes of Maine.

This species was discovered by Mr. Aaron Stone. It is a rather larger and considerably wider shell than *L. catascopium*, and the emargination visible on a profile view of the umbilical groove is far more profound. In general obesity it has a resemblance to *L. inflatus*, Brong. It was first sent to me by Mr. Aaron Stone, from the lakes of Maine. Dr. Bigsby presented me with a specimen which he obtained in Upper Canada; and I have recently received several from Mr. Titian Peale, also found in Maine, one of which is double the size of the figure represented in our plate 55, fig. 1. (*Say.*)

Limnæa emarginata, Say, Journ. Acad. Nat. Sc. II, 170 (1821); Long's Ex. II, 63; Amer. Conch. VI, pl. lv, f. 1 (1834).—Binney's ed. 67, 211, pl. lv, f. 1.—Haldeman, Mon. 10, pl. ii (1841).—DeKay, N. Y.

Moll. 73, pl. iv, f. 77 (1843).—Küster in Ch. ed. 2, 44, pl. viii, f. 8–10 (*Limnæus*).

Limneus ontariensis, Muhlfeldt in Küster.

Limnæa serrata, Haldeman, *l. c.*

It is said to have been found from New England to Washington Territory.

Considerable doubt exists regarding this variable shell, and its identity with *L. catascopium*. It is referred to that species by Stimpson (Shells of N. E. 32) and Gould (Lake Superior). Subsequently it has been referred to *L. elodes*, by Lewis (Boston Proc. V, 122). I have, therefore, given several figures of it in addition to the description of Mr. Say, leaving the question of its specific weight to be decided when more material has been collected. Fig. 75 is a copy of Mr. Say's original figure in the American Conchology. Fig. 77 is copied from one of Haldeman's, drawn from an authentic specimen of Mr. Say. A larger, better developed form, presented to the Smithsonian (No. 9144), by Prof. Haldeman, is drawn in Fig. 78; while a somewhat peculiar form is copied from Haldeman in Fig. 78. He suggests for it the name *L. serrata*, should it prove distinct, and describes it as characterized by elevated lines and undulating peritreme.

Fig. 76.

Limnæa emarginata.

Fig. 77.

Limnæa emarginata.

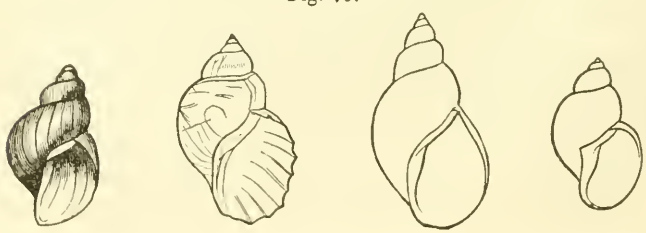
Fig. 78.

Limnæa emarginata.

Küster, *l. c.*, places in the synonymy of *emarginata* a var. A, *L. ontariensis*, Muhlf. in litt., with an ovate-conic shell, acuminate, whirls convex, the last ovate, aperture semioval.

Fig. 79 gives, at one view, the various forms of *L. emarginata*.

Fig. 79.



Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8302	5	Madison, Wis.	I. A. Lapham.	.....
8303	5	Lake Winnipeg.	R. Kennicott.	.....
8304	54	.....	.....	.....
8305	9	.....	Dr. J. Lewis.	.....
8480	3	.....	.....	Cabinet series.
9128	8	Wisconsin.	Dr. J. Lewis.	.....
9144	1	.....	Prof. Haldeman.	(Fig. 76.)
9161	2	Owasco Lake, N. Y.	Mrs. H. W. Parker.	.....
9166	1	Madison, Wis.	I. A. Lapham.	.....
9183	1	.....	Gen. Totten.	.....
9253	4	Lake Superior.	Newberry.	.....
9284	11	Otter Tail Creek, Min.	Kennicott.	.....

Limnæa catascopium.—Shell thin, horn-color, red, or blackish; whirls four or five, the first large and generally the remainder darker and rapidly decreasing to an acute apex and wrinkled across; aperture large, oval, not three-fourths the length of the shell. Length seven-tenths of an inch; breadth nearly one-half of an inch.

Fig. 80.

Limnæa catascopium.

Inhabitant yellowish, sprinkled with small, often confluent, paler dots; tentacula two, broad, pyramidal; eyes black, placed at the base of the tentacula; tail obtuse, rounded or emarginate, not so long as its shell. Pl. 2, fig. 3.

Fig. 81.

Limnæa catascopium.

It is with much hesitation that we adopt a new specific name for this shell, having always heretofore considered it the same as the *L. putris* of authors (which has been, perhaps, mistaken for the *Helix limosa* of Linné). As far as we can ascertain, the principal difference appears to be in the more oblique revolution of the whirls in the European species, and the more abrupt termination of the spire.

Inhabits the Delaware River and many other waters of the United States, in considerable numbers, and may be found plentifully, during the recess of the tide, about the small streams through which the marshy grounds are drained, in company with several other shells. When kept in a vessel of water, like others of its kind, it will proceed not only up the sides of its prison, but also along the surface of the water, the shell downward, with regularity of motion and apparent ease. In this case the reverted base of the animal is concave; and as the surface of the water is compelled to a corresponding concavity, the pressure of the atmospheric column will account for the sustentation of the animal (whose specific gravity is much greater than that of the water) in this singular position. It occasionally crawls to the margin of the water to inhale a supply of air; with this object the foramen is protruded to the surface, and opened with an audible snapping sound, similar to that produced by the resilience of the nib of a pen.

Fig. 82.

L. catascopium.

Its European analogue is the *L. peregrum*, L., from which it may be distinguished by a deeper fold of the columella,

and a more acute curvature of the inferior portion of the aperture. Pl. 55, fig. 2. (*Say.*)

Limnæa catascopium, Say, Nich. Ency. pl. 11, f. 3 (1817, 1818, 1819); Am. Conch. VI, pl. lv, f. 2 (1834); ed. Binney, 45, 211, pl. lxx, f. 3; pl. lv, f. 2.—Haldeman, Mon. 6, pl. i (1841).—Gould, Inv. of Mass. 223 (1841).—DeKay, N. Y. Moll. 67, pl. vi, f. 80 (1843).—Mrs. Gray, Fig. Moll. An. cccx, f. 7.—Küster in Ch. ed. 2 (*Limnæus*), 46, pl. viii, f. 15–21.—Potiez et Michaud, Gal. des Moll. I, 216, pl. xxi, f. 3–4.—Anon. Can. Nat. II, 201, fig. (1857).

Limnæa cornea, Valenciennes, Humb. & Bonpl. Rec. 1833, II, 251.

Limnæa pinguis, Say, J. A. N. Sc. V, 123 (1825); ed. Binney, 114 (not of Doubn, Pr. Zool. Soc. 1858, 134).

Limnæa virginiana, Lamarck, An. s. Vert. VI, 160.—Deshayes in Lam. 8, 411; ed. 2, III, 416; Enc. Meth. Vers, II, 362 (1830).—Delessert, Rec. des Coq. xxx, 4 (1831).

Limnæa sericata, Ziegler, teste Haldeman.

Helix catascopius, Eaton, Zool. Text-Book, 195 (1826).

This species is exceedingly abundant in the Delaware River. No. 9207 of the collection shows some of its variable forms. It has also been noticed from New England to Lewis River, and abounds in high latitudes in the British Possessions.

Limnæa pinguis, Say, is still represented by authentic specimens in the Academy's collection, one being drawn in my Figure 83. Say's description is given below. Mr. Haldeman agrees with me, and DeKay doubtfully places it in the synonymy of *L. catascopium*.

Limnæa pinguis, Say.—Shell oval, rather ventricose, pale dirty-yellowish; whirls nearly four, rapidly diminishing to the apex, which is dull fulvous; suture moderate, spire rather more than half the length of the aperture; aperture large; labrum with the inner margin a little thickened. Total length eleven-twentieth, aperture rather more than seven-twentieth, breadth seven-twentieth inch.

Fig. 83.

Limnæa pinguis.

Proportionally shorter and much more dilated than other species of the country, with the exception of *L. macrostomus*, from which it is readily distinguished. It inhabits the Delaware and Schuylkill Rivers near Philadelphia, in company with *L. catascopium*. (*Say.*)

Limnæa cornea is referred to *L. catascopium* by Haldeman and Gould, and also by Ferussac (Bull. Zool. 1835, 33). I have seen no authentic specimen, but give a translation of the original description below.

Limnæa cornea, Valenciennes (*l. c.*).—Shell ovate-conic, thin, subpellucid; whirls five, lightly striate; aperture not expanded.

This little *Limnæa* is but slightly ventricose; the aperture is hardly as large as in the following species (*L. naviculu*). The height of the last whirl is double that of the four other whirls taken together. Whirls with fine striæ parallel to the right lip. Aperture oval, its vertical diameter equalling two-thirds of that of the last whirl; breadth only one-half the length.

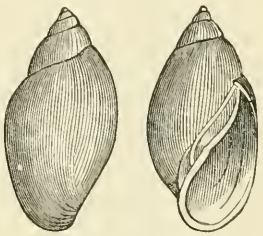
Color yellowish horn. Length 9 lines. Environs of Philadelphia. (*Valenciennes.*)

I have seen no authentic specimen of *L. virginiana*, and should hardly refer it to this species. It is, however, doubtfully placed in the synonymy by Haldeman. The original description of Lamarck and figures of Delessert here follow. It is referred to *L. columella* in Beck's Index. Dr. Gould tells me that specimens of *L. columella*, in the Leyden Museum, are labelled *L. virginiana.*

Limnæa virginiana, LAMARCK.—Shell ovate-ventricose, very thin, diaphanous, longitudinally wrinkled, grayish; whirls five, the last longer than the spire; labrum turned backwards.

Hab. Fresh-waters of Virginia. Its thinness renders it very fragile. 15 lines long. (*Lamarck.*)

Fig. 84.



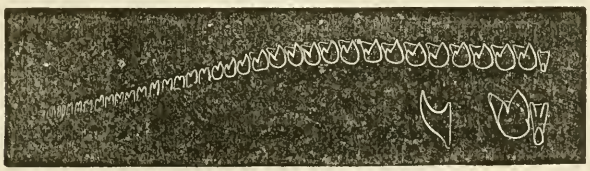
Limnæa virginiana.

In addition to the synonymy already given above, Haldeman and DeKay refer to this species *L. decollata* (*q. v.*). Lewis (Bost. Proc. VI, 122) places *L. catascopium* and *emarginata* in the synonymy of *L. elodes.* Küster, *l. c.*, quotes, as synonyms of *L. catascopium*, the following: *L. pinguis, L. cornea, L. virginiana.*

Fig. 80 and 82 are fac-similes of those of Mr. Say. Fig. 81 is from a specimen taken in the Delaware River.

The lingual dentition of *Limnæa catascopium* is figured in Fig. 85. There are 105 rows of teeth, 34 laterals in each row.

Fig. 85.



Lingual dentition of *Limnæa catascopium*.

Fig. 86 represents specimens in the collection, some of which bear a resemblance to forms of *L. catascopium*, though the more globose among them would hardly be referred to that species. So variable are the species of this genus that I have hesitated in proposing a specific name for them. They were collected by Dr. Hayden, at Grindstone Creek (No. 8304 of collection).

Fig. 86.

Limnæa catascopium?

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8308	7	Delaware River.	.....	.....
8309	31	Mohawk, N. Y.	.....	.....
8478	3	Delaware River.	Dr. J. Lewis.	Cabinet series.
9133	50	Erie Canal.	"	.....
9035	100	Moose Factory.	Drexler.	.....
8475	..	Lake Utah.	Capt. Burton.	.....
9134	20+	.....	Dr. J. Lewis.	.....
9207	20	Delaware River.	Binney.	.....
9329	2	Halifax.	W. Stimpson.	.....

Limnæa caperata, Say.—Shell suboval, a little oblong, obscurely yellowish-horn color; spire half the length of the mouth; apex acute; whirls slightly wrinkled across, and with very numerous, equal, subequidistant, elevated, minute, revolving lines; suture not very deeply impressed; aperture rather dilated; fold of the labium not profound.

Fig. 87.

Limnæa caperata.

Inhabits Indiana.

The remarkable character of this species consists in the numerous revolving lines with which the surface is marked, but these are so minute as to require the aid of a magnifier to bring them to view. It was found on land subject to inundation, near New Harmony, by Dr. Troost. (*Say.*)

Limnæus caperatus, Say, New Harmony Diss. II, 230 (1829); Descr. 23; Binney's ed. 148; Küster in Ch. ed. 2, 47, pl. viii, f. 27–30.

Limnæa caperata, Haldeman, Mon. 34, pl. xi, f. 1—9 (1842).—Adams, Shells of Vermont, 154 (1842).—DeKay, N. Y. Moll. 69, pl. iv, f. 66, 69; pl. v, f. 79 (1843).—Mrs. Gray, Fig. Moll. An. pl. cccx, f. 8.

Limnæa umbilicata, Adams, Am. Journ. Sc. [1], XXXIX, 374 (1840); Boston Journ. Nat. Hist. III, 325, pl. iii, f. 14 (1840).—Gould, Invert. of Mass. 218, f. 149 (1841).

This species is found in the British Possessions as far north as Hudson's Bay, and through the northern tier of States from New England to Lake Superior. The form known as *L. umbilicata* is found along the northern tier of States to Michigan, has been

quoted from Louisiana, catalogued by Adams from Jamaica, and placed by Poey in the synonymy of *L. cubensis*, Pfr.

No. 8429 of the collection has Prof. Adams's label "*L. umbilicata.*" I follow Haldeman and Küster in considering it a synonym of *L. caperata*, giving below a copy of Adams's figure and description.

Limnæa umbilicata.—Shell rather strong, brown, ovate, with slight striæ of growth, and more slight, numerous, irregular, revolving, impressed lines; whirls five, convex; suture deeply impressed; spire two-fifths of the length of the shell, conic, subacute at the apex, angle of its opposite sides about 65°; body whirl inflated, subglobular; aperture ovate, its plane, also the line of its length at angles of about 15° with the axis of the shell, three-fifths as long as the shell; labrum thin, inner margin dark-brown, inner submargin thickened with a light pink deposit; columella strong, reflected and spread over an umbilicus, which is rather large, but not profound, and formed chiefly by the reflection of the columella; fold of the latter inconspicuous. Length .28, breadth .17 inch. Cabinets of the Boston Soc. Nat. Hist., of Middlebury College, of Mr. Shiverick, and my own. New Bedford.

Fig. 88.

Limnæa umbilicata.

For this species I am indebted to Mr. Shiverick, who obtained numerous specimens. It resembles *L. caperatus*, Say, but in Say's species the aperture is but one-half the length, the revolving lines are raised, more distinct and numerous, the umbilicus is rather less, and there is one more whirl. (*Adams.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8291	11	Mohawk, N. Y.	Dr. J. Lewis.	.....
8292	1	Goose Island, Mich.	.....	.....
8293	18	New York.	Dr. J. Lewis.	.....
8484	6	.....	.....	Cabinet series.
9071	2	Hudson's Bay.	Drexler.	.....
8247	6	Milwaukee, Wis.	I. A. Lapham.	.....
8248	7	Westfield, Mass.	Dr. J. Lewis.	.....[Adams.
8249	3	.....	W G. Binney.	*umbilicata*, teste

Limnæa vahlii, Beck & Möll.—Shell ovate-oblong; spire convex-conic, rather obtuse; whirls about six; suture somewhat deep; aperture longer than a half the length of the shell. Length 9‴. (*Möller.*)

Fig. 89.

Limnæa vahlii.

Limnæa vahlii, Möller (1842), Ind. Moll. Gr. 4.—Küster in Ch. ed. 2, 27, pl. v, f. 8–10.
Limnophysa vahlii, Beck, teste Möller.

From a specimen received from Möller, and deposited in the collection, Fig. 89 was drawn. The species is

given by name only in Rink's Greenland, p. 76, by Mörch, with the following varieties :—

Var. *α. nitens* (*L. pingellii*, Bk. & Möll).
Var. *β. leucostoma* (*L. grönlandica*, Jay's Cat.)
Var. *γ. malleata.*
Var. *δ. parva;* peristome often unattached, with an elevated parietal line. (*Mörch.*)

Of these synonyms, *Limnæa grönlandica* is unknown to me. I find no description of it, though it is mentioned by name in Beck's Index Moll. Gr. p. 4, and by Mörch, Moll. Grön. p. 70.

Fig. 90 is drawn from an authentic specimen of *L. pingelii*, in the collection of the Smithsonian Institution. I have given Möller's description below, with a separate synonymy and museum register, in case it should have erroneously been placed in the synonymy of *L. vahlii.*

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8816	2	Greenland.	.....	Cabinet series. Fig. 89.

Fig. 90.

Limnæa pingelii.

Limnæa pingelii. Beck.—Shell ovate-elongate; spire conic, rather acute; whirls five; suture deep; aperture shorter than half the length of the shell; narrowly rimate. Length 6, 5‴. (*Möller.*)

Limnæa pingelii, Beck, Möller, Ind. Moll. Gr. 5 (1842).—Küster, Ch. ed. 2, 27, pl. v, f. 11, 12.
Limnophysa pingelii, Beck, teste Möller.
Limnæa vahlii, Mörch, pars, Rink's Gr. 76.

Greenland (see last species).

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8817	1	Greenland.	.....	Cabinet series. Fig. 90.

Limnæa wormskioldii. Mörch.—Intermediate species. Shell umbilicate, very solid; spire elongate, acute; suture deep; aperture semilunar; peristome sometimes disconnected. (*Mörch.*)

Limnæa wormskioldii, Mörch, Moll. Grönl. 76 (Rink's Greenl.).

I can find no fuller description or any further information regarding this species.

Limnæa holbollii, Beck & Möll. (Index Moll. Gr. 5 (1842).—Mörch, Moll. Gr. 76.

Fig. 91.

Limnæa holbollii.

I can find no description of this species. Fig. 91 is drawn from a specimen in the collection received from Möller.

Since writing the above I have met with a figure of the species in Küster, Chemn. ed. 2, 28, pl. v, f. 13–15, and the following description :—

Shell broadly rimate, ovate conic, rather thin, shining, horn-colored, striate; spire conical, truncated, suture rather profound, whirls convex; aperture ovate, shorter than one-half of the shell's length; peristome straight, its columellar termination white, with an obsolete fold. Height 5–6‴; breadth 2½–3‴. (*Küster.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8815	3	Greenland.	.....	Cabinet series. Fig. 91.

Limnæa adelinæ, Tryon.—Shell thin, semi-transparent, body whirl large, wide, convex; spire small, consisting of five convex volutions, attennating 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, greater diameter 8½; of aperture, length 9, breadth 5 mill.

Fig. 92.

Limnæa adelinæ.

San Francisco, California: Rev. J. Rowell. My cabinet and cabinet of Mr. Rowell.

This shell is nearly allied to *L. catascopium*, Say, and perhaps more nearly to *L. intermedia*, Mich., of Europe. From the former it may be distinguished by being more fragile, more transverse, with a smaller, more rapidly attenuating spire, but principally by the presence of an umbilical fissure, which in *catascopium* is entirely concealed by the appression of the labium. In this and other respects it is very near to *L. intermedia*, which, however, has a shorter spire, of fewer volutions. I name this species after my sister, Miss Adeline S. Tryon, who has evinced much interest in conchological pursuits. (*Tryon.*)

Limnæa adelinæ, Tryon, Proc. Phila. A. N. S. 1863, 149, pl. i, f. 12.

The original description and figure are copied above.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9335	4	Piscados, Cal.	G. W. Tryon.	.....

Limnæa vitrea, Haldeman.—Shell ovate, extremely thin and delicate; surface smooth and polished; lines of growth very fine; aperture ample: the labium presents a well marked fold, and is not appressed anteriorly; spire short.

Fig. 93.

Limnæa vitrea.

Ohio? Missouri?

Foreign analogue, *L. tenuis*, Bronn.

This species presents us with a shell which is probably thinner in texture than that of any other we have. For the specimens figured I am indebted to Mr. G. B. Emerson, President of the Boston Society of Natural History. (*Haldeman.*)

Limnæa vitrea, Haldeman, Mon. pt. 4, cover, p. 3; p. 47, pl. xiii, f. 14, 15 (1842).—DeKay, N. Y. Moll. 75 (1843).

Fig. 93 is copied from Haldeman, whose description is given above.

Limnæa traskii, Tryon.—Shell elongated, the spire drawn out and apex acute; whirls six, convex, almost shouldered, sutures deeply impressed; aperture small, oval, labrum well rounded, labium slightly rounded, not appressed below, not covering the umbilicus, which, though small, is very distinct. Color light horn or cinereous. Length 16, diam. 8; of aperture, length 7, diam. 5 mill.

Fig. 94.

Limnæa traskii.

Mountain Lake, California: Rev. J. Rowell. My cabinet, and cabinet of Mr. Rowell.

At first I was disposed to regard this shell as a variety of *L. proxima*, Lea, but a comparison with the type specimens of that species shows the following differences: the volutions are not so oblique, and are more rounded, the aperture is also more rounded, and the shell is umbilicated. Named in honor of Dr. J. B. Trask, one of the pioneers of Californian Conchology. (*Tryon.*)

Limnæa traskii, Tryon, Proc. Phila. A. N. S. 1863, 149, pl. i, f. 13.

The above are copies of the original description and figure of this species.

Limnæa pallida, Adams.—Shell moderately elongate, ovate-fusiform, very pale horn color, semi-transparent, not very thin, with fine, irregular striæ of growth, without revolving striæ; whirls about five and a half, moderately convex; suture well impressed; spire four-ninths of the length of the shell, acutely conic, its opposite sides containing an angle of about 45°, subacute at tip; body whirl not much enlarged, somewhat produced below; aperture five-ninths of the length of the shell, subovate-acute above, angle of its plane with the axis of the shell about 15°, of its length with the axis about 10°; labrum not thickened internally;

Fig. 95.

Limnæa pallida.

fold of the columella distinct, but not very large; umbilicus rather small. Length .48 inch; breadth .22 inch. Cabinets of the Boston Soc. N. H.; of Middlebury College; of Dr. A. A. Gould, of Boston; of J. G. Anthony, of Cincinnati; and my own.

Habitat and station. This species was found in considerable numbers at Storeham, Vt., on the shore of Lake Champlain, clinging to rocks and stones.

This species most resembles *L. acuta*, Lea, of which, however, I have not seen a specimen. That shell, in a very brief description, is said to be delicate, smooth, and dark-brown, while this is rather strong, striate, and of a very pale horn color, in living specimens, like the weathered shells of kindred species. The figure represents the columella of the *acuta* as intruding upon the aperture, which is not the case with this shell. (*Adams.*)

Limnæa pallida, Adams, Am. Journ. Sc. [1], XXXIX, 374 (1840); Bost. Journ. Nat. Hist. III, 324, pl. iii, f. 13 (1840); Shells of Vermont, 153 (1842).—Haldeman, Mon. 45, pl. xiii, f. 11–13 (1842).—DeKay, N. Y. Moll. 69, pl. iv, f. 67 (1843).

Found from New England to Michigan, and apparently in California. Mr. Lea quotes it from San Antonio Arroya.

Fig. 95 is a fac-simile of one of Adams's figures, accompanying his description, which is also copied above.

It must not be confounded with *L. pallida*, Guer.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8244	3	.....	.....	.....
8490	1	.....	Phila. Acad. Nat. Sc.	Cabinet series.
8733	11	San Francisco.	Rowell.	.....

Limnæa bulimoides, Lea.—Shell ovately-conical, rather thin, smooth, shining, diaphanous, brownish-yellow, slightly perforate; spire rather short; sutures small, whirls five, slightly convex, aperture ovate.

Fig. 96.

Limnæa bulimoides.

Oregon: Prof. Nuttall. My cabinet, and cabinet of Mr. Nuttall. Diam. .22, length .38 inch.

Among the shells taken by Prof. Nuttall, in his journey over the Rocky Mountains, was this small species, the aperture of which is formed very much like a *Bulimus*. The deposit of the columella is wide, and nearly covers the perforation, which consequently is very small. The aperture is nearly half the length of the shell, and the fold obsolete. Several of the specimens, although the substance of the shell is thin, have the apex eroded, some of the superior whirls being entirely gone. I have not observed this to be the case in other *Limnææ*. (*Lea.*)

Limnæa bulimoides, Lea, Proc. Am. Phil. Soc. II, 33 (1841); Trans. IX, 9 (1844); Obs. IV, 9.—Haldeman, Mon. 44, pl. xiii, f. 9, 10 (1842). —DeKay, N. Y. Moll. 75 (1843).

To Mr. Lea's original description I have added Fig. 96, copied from an authentic specimen. Among the specimens in the collection Nos. 8525 and 8870 were determined by Mr. Lea.

Found by Dr. Hayden, in his explorations of the Yellowstone, and at several points in the Pacific States.

I have seen specimens strongly resembling *Bulimulus pilula.*

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8525	6	Grindstone Creek.	.....	Named by I. Lea.
8570	6	Columbia River, near Fort Vancouver.	.....	[Cab. ser. .....
8730	10	San Francisco.	Rowell.	.....

Limnæa solida, Lea.—Shell acutely conical, solid, smooth, horn color; spire rather turreted; whirls five; columella reflected; aperture subovate.

Fig. 97.

Limnæa solida.

Hab. Wahlamat, near its junction with the Columbia River: Prof. Nuttall. My cabinet, and cabinet of Prof. Nuttall. Diam. 5-20th, length 8-20th of an inch.

A single specimen of this species was among the shells given to me by Prof. Nuttall. It differs from any species which I know, in being more solid. In this specimen the interior is brownish. (*Lea.*)

Limnæa solida, Lea, Trans. Am. Phil. Soc. VI, 94, pl. xxiii, f. 91 (1839); Obs. II, 94.—Haldeman, Mon. 36, pl xi, f. 10–13 (1842).—DeKay, N. Y. Moll. 75 (1843).

Limnæa apicina, Lea, Trans. Am. Phil. Soc. VI, 102, pl. xxiii, f. 94 (1839); Obs. II, 102.—Küster in Ch. ed. 2 (*Limnæus*), 48, pl. viii, f. 31–33.

Dr. Gould quotes *L. apicina* from Oregon.

Haldeman places *L. apicina* in the synonymy of *L. solida*, as does also DeKay and Küster. Copies of the descriptions and figures of both species are given.

Limnæa apicina, Lea.—Shell obtusely conical, rather solid, smooth, horn colored; spire rather short; whirls four; columella reflected, aperture subovate.

Fig. 98.

Limnæa apicina.

Hab. Wahlamat, near its junction with the Columbia River: Prof. Nuttall. My cabinet, and cabinet of Prof. Nuttall. Diam. .3, length .4 of an inch.

This small species is rather more globose than usual. It is distinguished by a dark apex. Within the outer lip there is a dark-brown band. (*Lea.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8523	11	30 m. w. of Ft. Kearney.	.....	.....

Limnæa humilis, Say. — Shell ovate-conic, thin, translucent, with slight wrinkles; volutions nearly six, convex, terminal one very minute; suture well indented; aperture about equal in length to the spire; labium with an obvious plate of calcareous deposit; a distinct and rather open umbilical aperture; color pale reddish-white or yellowish-white. Total length seven-twentieths inch. Fig. 99.

Limnæa humilis.

Inhabits South Carolina.

Of a dozen specimens sent me by Mr. Elliott, none exceeded the limit here assigned to the species. It differs much from any other species I have seen; a variety of it, sometimes quite black, was found by Dr. McEuen, at Oswego, on the Susquehanna. It may be useful here to remark that, in consequence of a typographical error in the first part of the second volume of this work, the species above described may be confounded with the *desidiosus*. The length of that shell is erroneously stated to be seven-twentieths of an inch, instead of seven-tenths, its true length. (*Say.*)

Limnæa humilis, Say, Journ. A. N. S. II, 378 (1822); Binney's ed. 110. —Haldeman, Mon. 41, pl. xiii, f. 1–8 (1842).—DeKay, N. Y. Moll. 71, pl. iv, f. 71 (1843).

Limnæus modicella, Say, J. A. N. Sc. V, 122 (1825); Binney's ed. 113.—Gould, Inv. of Mass. 218, f. 151 (1841).

Limnæa linsleyi, DeKay, N. Y. Moll. 72, pl. iv, f. 74 (1843).—Linsley, Shells of Conn. Am. Journ. Sc. [1], XLVIII, 282 (1845).

Limnæa parva, Lea, Proc. Am. Phil. Soc. II, 33 (1841); Tr. IX, 11 (1844); Obs. IV, 11.

Limnæa plica, Lea, Proc. Am. Phil. Soc. II, 33 (1841); Tr. IX, 10; Obs. IX, 10 (1844).

Limnæa griffithiana, Lea, *l. c.*, II, 33 (1841); IX, 8 (1844); Obs. IV, 8.

Limnæa planulata, Lea, *l. c.*, II, 33 (1841); IX, 9 (1844); Obs. IV, 9.

Limnæa rustica, Lea, *l. c.*, II, 33 (1841); IX, 10 (1844); Obs. IV, 10.

Limnæa exigua, Lea, *l. c.*, II, 33 (1841); IX, 9 (1844); Obs. IX, 10.

Limnæa curta, Lea, *l. c.*, II, 33 (1841); IX, 11 (1844); Obs. IV, 11.

Ranges from Maine to Georgia, and from Kansas to Lake Superior.

Fig. 99 is drawn from an authentic specimen in the collection of the Philadelphia Academy.

Haldeman places *L. modicella* in the synonymy of *L. humilis*. I have given below the original description and a figure (Fig. 100) of an authentic specimen, also from the Philadelphia Academy

Limnæa parva is placed doubtfully, by Haldeman, in the synonymy of *L. humilis*. I have so placed it after an examination of the description and the type which is drawn in Fig. 102.

Mr. Lea also quotes *L. exigua* from San Antonio Arroya. No. 8523 of the collection, from the Yellowstone River, is labelled *L. curta*, by Mr. Lea. These and the other species of the same author, given in the synonymy, are all drawn below, the figures being in each case from the original specimen. The original descriptions, also, are given.

Of *L. linsleyi*, also, I give the original description and a facsimile of the original figure.

Limnæa modicella, Say.—Shell blackish, not elongated; whirls rather more than four, convex; suture deeply impressed; apex acute; aperture very regular, the labium and labrum being sub-equally curved; the fold of the columella rather slight. Total length seven-twentieths of an inch, breadth one-fifth; length of the aperture one-fifth.

Fig. 100.

Limnæa modicella.

Smaller than any of the species I have hitherto described. It was found, by Dr. M'Euen, at Oswego, on the Susquehanna River, near the State of New York. (*Say.*)

Limnæa curta.—Shell subturreted, rather thin, shining, subdiaphanous, yellow, perforate; spire elevated; sutures impressed; whirls six, convex; aperture small, elliptical.

Fig. 101.

Limnæa curta.

Hab. Cincinnati, Ohio: T. G. Lea. Poland, Ohio: Dr. Kirtland. My cabinet, and cabinets of T. G. Lea and Dr. Kirtland. Diam. .18, length .32 of an inch.

A very small, erect species, resembling, in the form of the aperture, a *Bulimus*, the fold being scarcely perceptible. In its general outline it resembles a *Paludina* more than most *Limnææ*. In these characters it is allied to *L. bulimoides* herein described. The aperture is rather more than one-third the length of the shell, and the last whirl is wrinkled. The columella is thickened, and reflected over the perforation. (*Lea.*)

Limnæa parva.—Shell subturreted, thin, smooth, diaphanous, horn color, subperforate; spire elevated; sutures impressed; whirls five, convex; aperture elliptical.

Fig. 102.

Limnæa parva.

Hab. Cincinnati, Ohio: T. G. Lea. My cabinet, and cabinet of T. G. Lea. Diam. .12, length .22 of an inch.

This is the smallest species which has come under my notice. In general form it resembles *L. curta*, herein described. It is rather less inflated, has a longer aperture, and is diminutive.

The perforation, too, is smaller, and the columella more curved. The two specimens before me have the superior whirls black from the deposit of the oxide of iron. The aperture is about half the length of the shell. (*Lea.*)

Limnæa plica, Lea.—Shell turreted, rather thin, yellow, striate, imperforate; spire rather elevated; sutures impressed; whirls five, convex; aperture small elliptical. Fig. 103.

Hab. Tennessee: Dr. Troost. My cabinet, and cabinet of Dr. Troost. Diam. .18, length .38 of an inch.

Limnæa plica.

A small species with a large incurved fold. It resembles *L. exigua*, herein described, in size, but in the form of the columella it is entirely different. The aperture is about half the length of the shell.

Limnæa planulata, Lea.—Shell ovately conical, thin, smooth, subdiaphanous, brown, perforate; spire rather short; sutures impressed; whirls five, convex; aperture small, ovate. Fig. 104.

Hab. White Sulphur Springs, Virginia: P. H. Nicklin. My cabinet, and cabinet of P. H. Nicklin. Diam. .15, length .35 of an inch.

Limnæa planulata.

Several specimens of this small species are before me, one of them considerably larger than the others and possessing one more whirl. The whirls are inflated, but flattened in the middle. This gives a roundness to their superior part. The perforation is small and the fold scarcely observable. The aperture is less than half the length of the shell, and contracted. (*Lea.*)

Limnæa exigua, Lea.—Shell subfusiform, thin, striated, diaphanous, pale yellow, perforate; spire rather short; sutures impressed; whirls five, rather convex; aperture elliptical. Fig. 105.

Hab. Tennessee: Dr. Troost. My cabinet, and cabinet of Dr. Troost. Diam. .15, length .35 of an inch.

Limnæa exigua.

This is a small species about the size of *L. plica*, herein described, and in outline resembling it. It differs, however, altogether, in the columella, which is nearly, and the fold scarcely observable. The aperture is about one-half the length of the shell, and contracted at the lower part. (*Lea.*)

Limnæa rustica; Lea.[1]—Shell subfusiform, thin, imperforate; spire rather elevated; sutures impressed; whirls five, rather convex; aperture narrow elliptical. Fig. 106.

Hab. Poland, Ohio: Dr. Kirtland. My cabinet, and cabinet of Dr. Kirtland. Diam. .15, length .35 of an inch.

Limnæa rustica.

A single specimen only of this was received with some other

[1] H. & A. Adams (II, 253) catalogue a *Limnæa rustica*, Andrz, but whether it has priority of publication or not, I do not know.

species. It is a small and rather slender species, with a regular tapering spire and an aperture about half the length of the shell. The whole shell is covered over with a red coating of the oxide of iron, giving it a rough aspect. (*Lea.*)

Limnæa griffithiana, Lea.—Shell ovately conical, thin, substriate, shining, somewhat diaphanous, yellowish horn-color, perforate; spire rather short; sutures impressed; whirls five, convex; aperture elliptical.

Fig. 107.

Limnæa griffithiana.

Hab. Charlotte Lake, Columbia County, New York: Dr. Griffith. My cabinet, and cabinets of Dr. Griffith and Philadelphia Museum. Diam. .20, length .30 of an inch.

Rather a small species, differing from most in the form of the mouth, which is nearly a perfect ellipse. In a perfect specimen before me, the aperture within the margin of the lip is thickened by a raised line. The aperture is not quite one-half the length of the shell. I name it after R. E. Griffith, M. D., who seems to be the only person who has observed it. (*Lea.*)

Limnæa linsleyi, DeKay.—Shell ovate, subventricose; whirls five, rounded, and rapidly attenuated to the apex; suture deep; aperture oblong-oval, longer than the spire. Pillar-lip with a broad calcareous deposit, the lower portion reverted, and partially covering the umbilicus. Lip thin, forming a shoulder at its junction with the preceding whirl. Body-whirl towards the margin of the outer lip, flattened as in *megasoma*, and impressed with deep incremental striæ which are evident from within. Color: Epidermis chestnut, often obscured by a blackish subvillous pigment. Length, 0.25; aperture, 0.15.

Fig. 108.

Limnæa linsleyi.

This shell has affinities of form with *catascopium*, and more especially with the variety which is designated by Say as *L. pinguis*. That variety is, however, represented as having a moderate suture, and the whirls nearly four. I have ventured to impose upon it a new name, expressive of my obligations to the Rev. Mr. Linsley, of Stratford, who furnished me with the specimens from his neighborhood. (*DeKay.*)

Fig. 109.

Forms of *L. humilis.*

Fig. 109 gives, at one view, the various forms which I have referred to *L. humilis.*

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8258	15	Northern Georgia.	A. Gerhardt.	.....
8259	28	Big Sioux.	Dr. F. V. Hayden?	..... [Gerh.
8260	8	Northern Georgia.	A. Gerhardt.	"*L. sylvestris*," A.
8261	7	Otsego County, N. Y.	Dr. J. Lewis.	.....
8262	1½	.....	.....	.....
8263	1♯	Yellowstone River?	.....	.....
8264	19	N. Georgia.	A. Gerhardt.	.....
8265	64	Yellowstone River.	.....	.....
8266	6	Milwaukee, Wis.	I. A. Lapham.	..... [Gerh.
8267	14	N. Georgia.	A. Gerhardt.	"*L. riparius*," A.
8268	20	.....	W. G. Binney.	.....
8486	4	Georgia.	A. Gerhardt.	..... [I. Lea.
8523	1	Yellowstone River.	Dr. F. V. Hayden.	Named "*curta*" by

Limnæa ferruginea, Haldeman.—Shell ovate-conic, thin in texture and diaphanous, with four convex whirls, distinct suture, and well-marked columellar fold; aperture oval, about as long as the spire; labium appressed, ferruginous.

Fig. 110.

Oregon: Mr. Nuttall.

Closely allied to *L. humilis*, but may be distinguished by the want of an umbilic, and the well-defined fold on the columella. (*Haldeman.*)

Limnæa ferruginea.

Limnæa ferruginea, Haldeman, Mon. pt. III, p. 3 of cover (1841), 49, pl. xiii, f. 19, 20 (1842).—DeKay, N. Y. Moll. 75 (1843).

The above description and figure are copied from Haldeman.

Subgenus **LEPTOLIMNEA**, Swainson.

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

H. & A. Adams use *Omphiscola*, Rafinesque, as the name of this section. I protest against the use of the name in any other sense than proposed by Rafinesque (see spurious species of *Limnæa*). Beck's section *Omphiscola* corresponds with *Leptolimnea*, and he would be quoted as authority for it had he used a new name.

Limnæa kirtlandiana, Lea.—Shell turreted, thin, irregularly striate, pale horn-color, imperforate; spire attenuate; sutures impressed; whirls six, slightly convex; aperture narrow-elliptical.

Fig. 111.

Habitat. Poland, Ohio: Dr. Kirtland. My cabinet, and cabinets of Dr. Kirtland and T. G. Lea. Diam. .26, length .70 of an inch.

Limnæa kirtlandiana.

Many years since, Dr. Kirtland sent me several specimens of this shell. I am not aware of its having yet been de-

scribed. It may have been mistaken for *L. acuta*, being about the size and having the aspect of that shell. It may be distinguished from it by having a longer and narrower body whirl, and a shorter and narrower aperture. The fold on the columella is smaller and the outer lip less curved. It is a smaller species than the *reflexa*, Say, has one whirl less, and the mouth is longer. In other characters it resembles it, if the reflected lip be excepted. The aperture is rather less than half the length of the shell. Most of the specimens have an obscure brown line within the margin of the outer lip. The body whirl is disposed to be flattened, and is irregularly wrinkled. Under the lens, the fine striæ which usually are found in the *Limnææ*, may be observed beautifully displayed over the whole shell. The superior portion of all the specimens sent, have more or less deposit of the oxide of iron, which gives them the appearance of having two colors. (*Lea.*)

Limnæa kirtlandiana, Lea, Proc. Am. Phil. Soc. II, 33 (1841); Trans. IX, 12; Obs. IV, 12 (1844).

No. 8527 of the collection, so labelled by Mr. Lea, are from Apple Creek, lat. 47°.

Mr. Lea's description and a figure drawn from his type are given above.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8527	1	Apple Creek, lat. 47°.	Dr. F. V. Hayden.	Cab. series. Named by I. Lea.

Limnæa lanceata, Gould.—Shell moderate, thin, diaphanous, horn-colored, attenuated, delicately reticulated with incremental and revolving striæ; whirls six, flattened, quite oblique, the last equalling three-fourths of the shell's length; aperture narrow, almost equalling one-half the shell's length, acute posteriorly; columella fold conspicuous, acute, scarcely spiral; labrum with a submarginal chestnut band. Length $\frac{1}{3}$, breadth $\frac{1}{4}$ inch.

Fig. 112.

Limnæa lanceata.

North shore of Lake Superior, "Pic Lake," where it was collected by Prof. Agassiz.

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 whirls, in its aperture, which is proportionally much longer and narrower, and in being only about half their size. It is much like large specimens of *Physa hypnorum* reversed. (*Gould.*)

Limnæa lanceata, Gould, Proc. Boston Soc. Nat. Hist. III, 64 (1848); in Agassiz' Lake Superior, 244, pl. vii, f. 8–9; Otia, 206.

In addition to Gould's original description, I am able to add

Fig. 112, drawn from his type, which he sent me for this purpose. No. 9126 of the collection was presented by Prof. Agassiz, from among the original lot collected by him.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9126	1	Lake Superior.	Prof. Agassiz.	Type.

SUBGENUS **ACELLA**, HALD.

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

Limnæa gracilis, JAY.—Shell very slender, with from four to six flat and very obliquely revolving whirls; suture distinct; lines of accretion fine; labium unattached, without fold; aperture ovate, spread out, and rounded at both ends. Color nearly white.

Fig. 113.

Limnæa gracilis.

This is the most slender species of *Limnæa* known, and was discovered by Prof. Emmons in Lake Champlain.

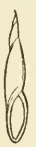
Prof. Adams mentions a specimen in his cabinet one inch in length, and in the convexity of the penult whirl only .15 inch diameter. The last whirl is scarcely broader, except across the lips, both of which are expanded. Although nearly seven times longer than the average breadth, it has only four and a half whirls. (*Haldeman.*)

Limnæa gracilis, JAY, Cat. 3d ed. 112, pl. i, f. 10, 11 (1839).—ADAMS, Shells of Vermont, Thom. Vt. 153, pamphlet, 3 (1842).—DEKAY, N. Y. Moll. 70, pl. iv, f. 73 (1843).—HALDEMAN, Mon. 50, pl. xiii, f. 21 (1842).

Acella gracilis, CHENU, Man. de Conch. II, 480, f. 3545.

The species has also been quoted from Wisconsin, Ohio, and Michigan. Fig. 113 was photographed from nature on to the wood. The following are Jay's description and figure:—

Fig. 114.



Limnæa gracilis.

Essex County, N. Y. I am indebted to Prof. Benedict, of Burlington, Vt., for two specimens of this very slender and fragile *Limnæa*. (*Jay.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8524	10	Schuyler's Lake, N. Y.	Dr. J. Lewis.	Cabinet series.
9127	1	New York.	"	.....
9068	20+	Otsego County, N. Y.	"	.....

Spurious Species of Limnæa.

Limnæa decisa, Say, Nich. Ency. ed. 1 and 2, pl. ii, f. 6 = *Melantho decisa.*
Limnæa heterostropha, Say, Nich. Ency. pl. i, f. 6 = *Physa heterostropha.*
Limnæa subcarinata, Say, Nich. Ency. pl. i, f. 7 = *Lioplax subcarinata.*
Limnæa virginica, Say, Nich. Ency. pl. ii, f. 4 = *Melania virginica.*
Limnæa vivipara, Say, Nich. Ency. pl. i, f. 5 = *Vivipara contectoides.*

I find *Limnæa nigrescens*, *gracilis*, and *reticulata* mentioned as new species by DeKay in N. Y. Zoological Report of Dec. 20, 1839, p. 32. I know of no other mention or any description of the species.

Limnæa heterostropha is mentioned by name only in Adams' List of Fresh Pond Shells. *Physa heterostropha* being also mentioned, I do not know to what species he may refer. (Silliman's Journ. [1], XXXVI, 392.)

Limnæa ovata, Lam. is mentioned in the Catalogue of Shells of Massachusetts, 1838, p. 37. I do not know what species is referred to under this name.

Woodward (Man. 399) quotes *Limnæa truncatula* from the Canadian region, referring it doubtfully to *L. decollata.* (See remarks under *L. desidiosa.*)

Among the writings of C. S. Rafinesque occur some descriptions of *Limnæidæ* which I repeat here. I translate them from the Podrome de 70 nouveaux genres d'animaux, &c., in the Journal de Physique, de Chemie, et d'Histoire Naturelle, LXXXVIII, June, 1819. However little claim to accuracy the writings on American conchology of this author may possess, it seems to me we are bound to acknowledge and examine carefully all his published descriptions, rather than entirely ignore their existence, as some would do.

Omphiscola, l. c. p. 423.—Differs from *Lymnula* (*Lymnea*, Auct.) by its inferior lip being detached from the columella and divided from it by a long umbilicus. Family of *Limnidæ.* Many lacustrine and fluviatile species.

Espiphylla, l. c.—Differing from *Lymnula* (*Lymnea*, Auct.) by its rounded aperture and its claviform tentacles carrying the eyes at their end. Family *Lymnidæ.* Only one lacustrine species, *E. nympheola.*

Cyclemis, l. c. p. 424.—Differs from *Lymnula* by its rounded shell of two or three slightly oblique whirls. Aperture large, almost round. Animal like that of *Espiphylla?* Two lacustrine species, *C. minutissima* and *C. olivacea.*

Lomastoma, l. c.—Shell acute, pyramidal. Aperture oblong, base obtuse, summit sharp, entirely surrounded by a detached, marginal, acute lip, which is decurrent and inflected at the junction of the summit; no operculum or umbilicus. Animal unknown. Singular genus of the family *Lymnidæ?* One only known species, *L. terebrina.* Shell subulate, smooth,

four whirls, pale red; aperture one-third the shell's length, breadth one-third of its length. Very rare. In brooks.

Limnæa lubricoides, LEA, of Nebraska Territory, is catalogued without description by Mr. LEA in Warren's Report on Nebraska. (Ex. Doc. H. of Rep. 2d Sess. 35th Cong. 1858–9, Vol. II, part 3, p. 724.) No description of any such species has been published.

Limnæa corrugata is quoted, without description, from Georgia, by SOWERBY in Tankerville Coll. p. 42 (1825), *Helix corrugata*, BUDGIN MS. being given as synonym.

Limnæa petitii, BECK, Newfoundland. No description. Index, p. 113.

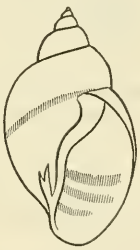
Omphiscola pugio, BECK (Index) is mentioned from Mexico, without description.

Limnæa rugosa, VALENCIENNES, appears an immature specimen of some *Bulimulus*. I give below a copy of the original description, and an outline of the original figure. According to FERUSSAC (Bull. Zool. 1835, p. 33), it is his *Cochlogena dombeiana*. See also PFIEFFER, Symb. III, 83.

Limnæa rugosa, VALENCIENNES.—Shell ovate-conic, thin, white, with an obsolete yellowish band; whirls with very numerous furrow-like wrinkles.

This species has six whirls, of which the last is twice as long as the others; ventricose; surface wrinkled by numerous longitudinal ridges, which are not exactly parallel to the edge of the right lip; they are still apparent on the fifth whirl, but on the fourth are mere fine striæ, while the three first whirls have neither striæ or folds.

Fig. 115.



Limnæa rugosa.

Aperture an elongated ellipse, slightly narrowed towards the base, its transverse diameter being but one-half the longitudinal; right lip thin and sharp. Within the traces of the external ridges of the last whirl are visible.

Columella thin, edge rounded, thrown back on the last whirl so as to form a very small umbilicus. Color white, with transverse reddish band, parallel to the suture, on the middle of the last whirl. Length 14 lines.

Hab. Mexico (Bonpland). (*Valenciennes.*)

Limnæa rugosa, VALENCIENNES, in Humb. & Bonp. Rec. d'Obs. II, 250, pl. lvi, f. 5 (1833).—HALDEMAN, Mon. 15, pl. iii, f. 4, 5 (1841).—DEKAY, N. Y. Moll. 75 (1843).

Limnæus rugosus, KÜSTER, in Ch. ed. 2, 38, pl. viii, f. 3, 4.

Limnæa conoidea, SAY, and *L. lineata*, SAY, are mentioned by name by H. & A. ADAMS, Gen. Rec. Moll. II, 253. I know of no descriptions of such species by that author.

Limnæa plicata, Lea, mentioned by name only in the Canadian Geological Report for 1858, by Mr. D'Urban, is, I suppose, *L. plica*, Lea.

Limnæa fossaria is quoted without description from Canada, &c., by J. de C. Sowerby in Richardson's Fauna Boreali-Americana, III, 316 (1836).

Limnæa merostoma, Rav. Cat. p. 11, err. typ. for *macrostoma*.

Limnæa platystoma, Haldeman.—Shell thin, transparent, and globose; composed of four whirls, the last of which constitutes nearly the entire shell; aperture $\frac{2}{3}$ the entire length, very wide posteriorly; labium and labrum nearly parallel. Length $\frac{1}{2}$ inch.

Fig. 116.

Limnæa platystoma.

Hab. Vermont. (*Haldeman.*)

Limnæa platystoma, Haldeman, Suppl. to Mon. pt. I, p. 2 (1840).

The above is Haldeman's description, and Fig. 116 is from his type. No. 9131 was presented by him. Thus we have all the information extant regarding the species. As Prof. Haldeman's original label refers the shells to Maine or Marseilles, it must be considered a doubtful inhabitant of America.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9131	1	Maine or Marseilles.	Haldeman.	Fig. 116. Type.

Limnæa alternata, Say, mentioned by name only by Bell (Can. Geol. Rep. for 1858) is unknown to me, as is also *L. opacina*, Bell.

Fossil Species of Limnæa.

I am indebted to the kindness of Dr. Meek for the following list of fossil species:—

Limnæa vetusta, Meek, Proc. Acad. Nat. Sc. 1860, 314.
Limnæa similis, Meek, Proc. Acad. Nat. Sc. 1860, 314.
Limnæa diaphana, Evans & Shumard, Proc. Acad. Nat. Sc. VIII, 1860, 165.
Limnæa nebrascensis, Evans & Sh. Proc. Acad. Nat. Sc. VIII, 1860, 165.
Limnæa tenuicostatus, Meek & Hayden, Proc. Acad. Nat. Sc. 1860, 117.
Limnæa meekiana, Evans & Shumard, MSS.
Limnæa? multistriata, Meek & Hayden, Proc. Acad. Nat. Sc. 1860, 431.

Limnæa (*Limnophysa*) *galbana*, Say.—Shell subovate; whirls nearly five, very convex; suture very deeply impressed; apex acute; body whirl a little flattened in the middle; aperture not dilated; columella with the sinus of the fold very obvious. Length three-tenths of an inch; aperture rather more than half the whole length.

Fig. 117.

Limnæa galbana.

For this shell I am indebted to Mr. Nuttall, who obtained it in a marl pit near Franklin, New Jersey. He

considers it fossil, as well as numerous specimens of *Planorbis campanulatus, Valvata tricarinata,* and *Physa heterostropha,* found with it. I have never seen a recent specimen, but the present corresponds with some individuals belonging to the Philadelphia Museum, also said to be fossil. (*Say.*)

Limnæus galbanus, Say, Jour. Acad. Nat. Sc. Phila. V, 123 (1825): Binney's ed. 114.

Limnæa galbana, Haldeman, Mon. 51, pl. xiii, f. 22, 23.

Mr. Say's type, still preserved in the Philadelphia Academy is drawn in Fig. 117. I have heard of no other locality than that given by Say.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9340	10	New York.	Dr. Lewis.	.....

——————?

——? **berendti,** Pfeiffer. Fig. 118 is drawn from a curious shell lately received by the Smithsonian Institution from Mirador, sixty miles west from Vera Cruz, under the name of *Physella berendti,* Pfr. It belongs to a new genus, but *Physella* is preoccupied by Haldeman.

Fig. 118.

——?
berendti.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9357	2	Mirador, Mex.	Dr. Berendt.	One Fig.

POMPHOLYX, Lea.

Tentacles short, stout, rounded. Mantle[1]—? Foot short, bluntly rounded posteriorly.

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

Jaw —?

Lingual membrane —?

[1] I have seen only specimens in alcohol. From these it appears that the only known species cannot be a *Limnæa,* as its tentacles are not flattened and triangular. The eyes are at the place usual in *Limnæidæ.*

Fig. 119.

Pompholyx effusa, Lea.—Shell small, striate, roundly gibbous, rather thin, effuse, reddish horn-colored; whirls five, flattened above, convex below; aperture subrotund, dilated, within white, spotted.

Sacramento River: Dr. Trask. (*Lea.*)

Pompholyx effusa, Lea, Proc. Phila. Acad. VIII, 80 (1856); Jour. de Conch. 2d series, II, 208 (trans.), 1857.—H. & A. Adams, Gen. Rec. Moll. pl. cxxxviii, f. 11.

Pompholyx effusa, enlarged.

Fig. 119 is drawn from Mr. Lea's type.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9242	5	Pitt River.	Dr. Newberry.	Type.

CARINIFEX.

Tentacles —? Mantle —? Foot —?

Shell dextral, spiral, inflated, angular, horn-colored; spire terraced, whirls numerous, angular, visible above, last whirl 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.

Jaw —? Lingual membrane —?

The general appearance of the shells for which the generic name of *Carinifex* is proposed would place them among the *Limnæidæ*. Nothing is known of the generic characteristics. The base of the shell resembles somewhat *Taphius*, but that subgenus has the upper surface of *Planorbis*, flattened, spire sunken, whirls rounded.

Fig. 120.

Carinifex newberryi.

Carinifex newberryi, Lea.—Shell light horn-colored, depressed, turreted, very minutely striated, above and below acutely carinated, broadly and deeply umbilicated, whirls five, flat; aperture large, light horn-colored, subtriangular.

Klamath Lake and Canoe Creek, California: Dr. J. S. Newberry. (*Lea.*)

Planorbis newberryi, LEA, Proc. Phila. Acad. Nat. Sc. 1858, 41.

Fig. 121.

C. newberryi.

Fig. 120 is drawn from the original specimen in Mr. Lea's cabinet. A more elevated form is figured also.

It has also been found in Clear Lake, California.

Another form of this species is figured in Fig. 122. It is less carinated, much more rounded in the whirls, but apparently identical with *C. newberryi*. It is from Pitt River, California.

Fig. 122.

C. newberryi.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8726	..	Clear Lake, Cal.	Dr. Yeatch.	Named by Lea.
8727	..	"	"	Cab. ser. Named by
9254	21	Klamath Lake.	Dr. Newberry.	Type. [Lea.
9256	15	Canoe Creek, Cal.	"	.....
9341	6	Pitt River, Cal.	Dr. Cooper.	Type.
9342	1	"	"	" Figured.

PHYSA, DRAPARNAUD.

Tentacles slender, setaceous. Mantle covering part of the shell, the margin fringed or digitate. Foot long, acuminate behind.

Fig. 123.

Physa heterostropha.

Shell sinistral, oblong, thin and polished; spire acute; aperture oval, rounded anteriorly, not dilated; inner lip spread over the last whirl, simple in front; outer lip acute.

Fig. 124.

Jaw of *Physa*.

Jaw single, superior, chevron-shaped.

Lingual membrane —?

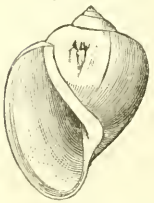
This genus is widely distributed over the globe, and is numerous in species in this country, where it extends more southerly than *Limnæa*. In its habits it is more active than the other *Limnæidæ*, both in walking and in gliding, shell downwards, on the surface of the water.

It will be seen in the generic descriptions of *Physa* and *Bulinus* that the former name is restricted to those species having a digitated mantle, and the latter applied only to those whose

mantle is simple. As Adanson founded his genus on a species having a simple mantle, his name is retained for the last section, leaving Draparnaud's[1] later name for the first section. Thus any confusion of synonymy is avoided.

Physa lordi, Baird.—Shell thin, quite large, corneous, tumid, gibbous, aperture large; outer lip acute, marked with an external white or brownish line; external surface very minutely decussated; whirls six, the first two minute, tinged with black, the last swollen, four times the size of the others. Length from $\frac{3}{4}$ to 1 inch, breadth from $\frac{1}{2}$ to $\frac{3}{4}$.

Fig. 125.



Physa lordi.

Fig. 126.

Physa lordi.

Lake Osoyoos, British Columbia. (*Brit. Mus.*)

This species is one of the largest of the genus, and is much swollen and gibbous. The outer lip is generally marked with a streak of brown edged with white, which mark is left in those specimens which are of older growth, leaving a white callous-looking line of growth edged with brown, nearly in the centre of the last whirl, which is very large—being about four times the size of all the others put together. The two upper whirls, which are very small, are of a black color. The surface of the shell is finely decussately striated.

The *Physa heterostropha* of Say abounds in the Sumas Prairie, on the Fraser River; but its place seems to be taken on the higher ground towards the Rocky Mountains by the *Ph. lordi* (*Baird.*)

Physa lordi, Baird, Proc. Zool. Soc. London, 1863, p. 68.

Fig. 127.

Physa lordi.

I have given above the original description of this species and Figs. 125 and 126, copied from advance proofs of the plates illustrating the British Boundary Commission Report. Fig. 127 is drawn from a specimen collected by the American Commission of the same Survey.

This is the largest North American species of *Physa* yet described.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9310	2	E. of Ft. Colville, W. T.	N. W. Boundary Surv.	Fig. 127.

[1] Draparnaud did not make this distinction in the genus, but his first species has a fringed mantle.

Physa gabbi, Tryon.—Shell large, thin, closely striated with the lines of growth; body whirl inflated, its upper half flattened, so that the labrum appears angulated in the middle; spire moderate, apex acute, whirls six, convex, with distinct sutures. Color light corneous, very much polished within; lip margined with red. Length 25, diam. 13; of aperture 15, breadth 3 mill.

Fig. 128.

Physa gabbi.

Fig. 129.

Physa gabbi.

Mountain Lake, Cal.: Rev. T. Rowell. Santa Ana River, Los Angelos County, Cal.: Wm. Gabb. My cabinet, and cabinets of Mr. Rowell and Mr. Gabb.

Several specimens of this fine large species were communicated to me by my friend Mr. Wm. Gabb, after whom I take great pleasure in naming it. It is a much larger, thinner species than *Ph. heterostropha*, Say, and is at once distinguished by the peculiar flattening of the superior portion of the body whirl. The same character will also distinguish it from *Ph. bullata*, Gld., in which species the aperture, moreover, is proportionally longer. (*Tryon.*)

Physa gabbi, Tryon, Proc. Phila. Acad. Nat. Sc. 1863, 149, pl. i. f. 14.

This is a very well-marked species. Fig. 128 is copied from the original figure of Mr. Tryon, whose description is given above. Another figure also is given.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9336	4	California.	G. W. Tryon.	.....

Physa gyrina, Say.—Shell heterostrophe, oblong; whirls five or six, gradually acuminating to an acute apex; suture slightly impressed; aperture more than one-half, but less than two-thirds the length of the shell; labrum a little thickened on the inner margin. Length rather less than one inch.

Fig. 130.

Physa gyrina.

Inhabits waters of the Missouri.

Of this species I found two specimens at Bowyer Creek, near Council Bluff. It differs from *P. heterostropha* in magnitude, in having a more elongated spire, and less deeply impressed suture. (*Say.*)

Physa gyrina, Say, J. A. N. S. II, 171 (1821).—Binney's ed. 67.—Haldeman, Mon. 32, pl. iii, f. 1–6 (1843).—? DeKay, N. Y. Moll. 79, pl. v, f. 87 (1843).—Chemnitz, ed. 2, 20, pl. v, f. 7–10.—Adams, Shells of Vermont, 154 (1842).

Physa elliptica, Lea, Tr. Am. Phil. Soc. V, 115, pl. xix, 83 (1837); Obs.

I, 227.—DeKay, N. Y. Moll. 77, excl. syn. *cylindrica*, err. typ. (1843). —Chemnitz, ed. 2, 22, pl. iii, f. 20–22.

Physa hildrethiana, Lea, Pr. Am. Phil. Soc. II, 32 (1841); Trans. IX, 7 (1844); Obs. IV, 7.

It is mentioned in catalogues, &c., as inhabiting a wide area, the extreme points being Vermont, San Francisco, Michigan, Georgia, Louisiana and Utah.

Mr. Say's type of *Physa gyrina* is still preserved in the Academy at Philadelphia. It is drawn in Fig. 130.

No. 8108 of the collection was labelled *Ph. elliptica*, by Mr. Lea. It does not appear to me distinct from this species, in the synonymy of which it is also placed by Haldeman. A copy of Lea's original description and figure here follow. The name has also been used by Parreyss.

Physa elliptica, Lea.—Shell sinister elliptical, very thin, pellucid, chestnut colored, shining; spire rather short; whirls four; outer lip margined; aperture narrow. Diam. .2, length .5 inch.

Fig. 131.

Physa elliptica.

Hab. ———: T. G. Lea. My cabinet.

This species is less inflated and more of a chestnut color than any I am acquainted with. Its color is almost reddish, and the light-colored margin of the outer lip is remarkable. The aperture is rather contracted, and the whole shell somewhat elongate. (*Lea.*)

Physa hildrethiana, Lea, also appears to me a synonym of *Physa gyrina*. Mr. Lea's description and a figure of his original specimen here follow.

Physa hildrethiana, Lea.—Shell elliptical, somewhat compressed, long, somewhat pellucid; spire obtusely elevated; whirls five; lip margined; aperture long, compressed.

Fig. 132.

Physa hildrethiana.

Hab. A lake in Illinois: Dr. Hildreth. Diam. .40, length .75 of an inch.

This species is among the largest, and is perhaps the most remarkable *Physa* yet observed in this country. The aperture is little more than half the length of the shell. The apex is very obtuse, and the whole shell is somewhat cylindrical. A single specimen was brought by Mr. Nicklin from Dr. Hildreth, and I name it after him, as he seems first to have observed it. (*Lea.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8073	12	South Carolina.	W. Stimpson.	.....
8074	33	Grindstone Creek.	.....	.....
8075	36	Utah Territory.	.....	.....
8076	11	.....	.....	.....
8077	33	Farwell's Mills, Madi-	S. F. Baird.	.....
8078	50	St. Louis. [son, Wis.	.....	.....
8079	8	Ann Arbor, Mich.	W. G. Binney.	.....
8080	12	St. Clair River.	.....	.....
8081	3	Michigan.	.....	.....
8082	3	Racine, Wis.	S. F. Baird.	.....
8084	2	Milwaukee, Wis.	I. A. Lapham.	.....
8085	5	Utah.	Capt. J. H. Simpson.	.....
8086	10	.....	.....	Cabinet series.
8520	2	.....	W. G. Binney.	.....
8729	1	San Francisco.	Rowell.	Cab. ser. W. Coast.
9094	50	Grand Rapids, Mich.	Dr. Lewis.	*P. hildrethiana*, teste
9167	1	Michigan.	W. G. Binney.	..... [Lewis.
8108	64	Grand Rapids, Mich.	Dr. J. Lewis.	*P. elliptica*, Lea.
8109	1	Indiana.	W. G. Binney.	Named by I. Lea.
8516	7	Michigan.	Dr. J. Lewis.	Named by Dr. R. E.
9209	14	Uniontown, Ala.	Dr. Showalter.	Cab. ser. [Griffith.

Physa ampullacea, Gould.—Shell large, ovate-ventricose, thin, fragile, shining, horn-colored; spire elevated, acute; whirls 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 1, breadth $\frac{19}{20}$ to $\frac{11}{20}$ inch.

Fig. 133.

Physa ampullacea.

Found in Oregon by Dr. J. G. Cooper.

Distinguished by its large size, inflated form, and delicate structure; sometimes the form is somewhat cylindrical. It accords most nearly with Haldeman's plate iii, f. 9, which was given him as *P. sayii*, Tappan. It is much more delicate, and less polished than *P. heterostropha*, Say, and the aperture is less elongated. (*Gould.*)

Fig. 134.

Physa ampullacea.

Fig. 135.

Physa ampullacea.

Physa bullata, Gould, Proc. Bost. Soc. Nat. Hist. V, 128 (1855); Otia, 216 (not of Pot. et Mich.).

Physa ampullacea, Gould in litt.

Found also in Lake Oyosa, Washington Territory, by Dr. Cooper, one of whose specimens is figured above. (Fig. 133.)

The name proposed by Dr. Gould for this species being preoccupied by Potiez and Michaud, I, 223, 1838, he suggests that adopted above.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8574	4	.....	.....	.....
8722	5	.....	.....	.....
9170	2	Oregon.	Dr. J. G. Cooper.	Original ex'm named
9264	2	Rhett Lake, Cal.	Dr. Newberry.	..... [by Gould.
9267	11	Upper Klamath Lake.	"	.....

Physa sayii, Tappan.—Shell sinistral, ovate, color brownish-yellow or chestnut; whirls five; the first large, the others small, terminating in an acute, dark brown apex; aperture large, four-fifths of the length of the shell; translucent. Length 1, breadth $\frac{7}{10}$ inch.

Fig. 136.

Physa sayi.

I first found this shell, May, 1837, in a small lake called Lake Pipin, which is separated about fifty rods from the Cuyahoga River, in Franklin Township, Portage County, Ohio, the same locality where was found the *Anodonta pepiniana*, Lea. All the shells of this species hitherto found were dead, although much time was spent in examining for live ones, in May, 1837, and June, 1838. A few only were found, and are in the cabinets of Mrs. Say, Dr. Kirtland, Dr. Ward and myself. (*Tappan.*)

Physa sayii, Tappan, Amer. Journ. Sc. [1], XXXV, 369, pl. iii, f. 3 (1839).

I am unacquainted with this species. Judging from the description and figure, which I have copied above, I should not agree with Haldeman in placing it in the synonymy of *P. ancillaria.*

Physa vinosa, Gould.—Shell thin, ovate-globose, red, with minute spiral striæ and thin epidermis; spire obtuse; whirls four, the last very large; aperture ovate-lunate, three-fourths the shell's length, liver brown within; columella straight and thin. Length $\frac{3}{4}$, lat. $\frac{1}{2}$ inch.

Fig. 137.

Physa vinosa.

Brought by Dr. C. T. Jackson from the Lake Superior region.

A remarkably inflated species, most like *P. ancillaria*, Say, but is not shouldered or widest behind the middle, nor tapering anteriorly. It is well distinguished by its thin structure, striated surface, wine-red color externally, and liver-brown internally. (*Gould.*)

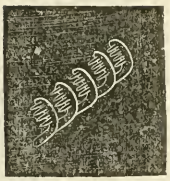
Physa vinosa, Gould, Proc. Bost. Soc. N. H. II, 263, fig. (1847); in Agassiz' Lake Sup. 244, pl. vii, f. 10–11 (1850); Otia, 201.

No. 9096 of the collection was presented by Prof. Agassiz from the original lot collected by him. Gould's description and figure are copied above.

It has also been catalogued from Michigan.

The lingual teeth of the lateral rows of *Physa vinosa* are represented in Fig. 138.

Fig. 138.



Lingual dentition of *Physa vinosa*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9096	1	Lake Superior.	L. Agassiz	Original lot. Type.
9160	2	Owasco Lake, N. Y.	Mrs. H. W. Parker.	(Really *P. vinosa?*)

Physa ancillaria, Say.—Shell heterostrophe, sub-globose, pale yellowish; whirls rather more than four, very rapidly attenuated; spire truncated, hardly elevated beyond the general curve of the surface; suture not impressed; aperture but little shorter than the shell, dilated; labrum a little thickened on the inner margin. Length more than one-half of an inch.

Fig. 139.

Physa ancillaria.

The spire of this species is unusually short, truncated at tip like the *Paludina decisa*, nob.; and the suture is so inconspicuous as to give rise to the name which I have chosen for it. My brother, B. Say, obtained it in the Delaware River, near Easton, and Mr. Jessup collected numerous specimens in the Connecticut River, above Hartford. It may be distinguished from *P. heterostropha*, nob., by the shorter and truncated spire, inconspicuous suture, as well as by the more obtusely rounded junction of the labrum with the base, and by the general form. (*Say.*)

Physa ancillaria, Say, Jour. Acad. Nat. Sc. V, 124 (1825); Binney's ed. 114.—Haldeman, Mon. 27, pl. iii, f. 1–10 (1843).—Gould, Invert. 213, f. 142 (1841).—Adams, Shells of Vermont, 154 (1842).—DeKay, N. Y. Moll. 78, pl. v, 90 (1843).—Chemnitz, ed. 2, 20, pl. xii, f. 12–13.—Chenu, Man. de Conch. II, 480, f. 3550.—Anon. Can. Nat. II, 211, fig. (1857).

Physa obesa, DeKay, N. Y. Moll. 78, pl. v, f. 86 (1843).

This species appears to range from New England to Louisiana. It is very numerous in the Delaware River at Burlington, on the muddy shores left bare at low tide. The animal burrows into the mud as soon as left by the water, and remains concealed until its return. On the piers of the wharves it crawls downwards with the fall of the tide and upwards again as it rises, thus keeping always near the surface.

Physa obesa, DeKay, appears to me identical with this species, judging only from his description and figure here copied.

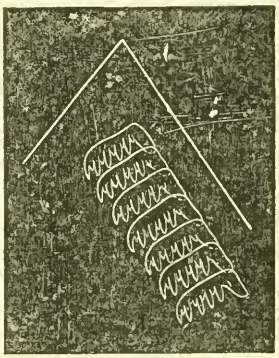
Physa obesa, DeKay.—Shell ventricose; when young, very thin and fragile. Whirls four to five, rapidly attenuated to a minute and slightly elevated polished apex. Body whirl inflated, with its upper surface near the suture depressed, and forming an obtuse angle with the lower portion; suture semicanaliculate. Surface polished, with minute incremental lines. Aperture elliptical. Color pale horn. Length 0.5, of aperture 0.4 inch.

Fig. 140.

Physa obesa.

This species was communicated to me by Dr. Budd, who obtained it from the Mohawk and Hoosic Rivers, Rensselaer County. I have since received from the same gentleman specimens eight-tenths of an inch long, and quite solid with a stout callus. Some naturalists who have seen it are disposed to consider it as identical with *P. ancillaria*. (*DeKay.*)

Fig. 141.



Lingual dentition of *P. ancillaria.*

Haldeman refers *Physa sayii*, Tappan, to *P. ancillaria*. I have considered it as distinct.

The lateral teeth of the lingual membrane of *Physa ancillaria* are represented in Fig. 141, as well as the line formed by one transverse row of the teeth.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8096	9	Loup Fork.	.....	.....
8097	2	Hudson River.	Dr. J. Lewis.	.....
8098	5	Cherry Creek.	.....	.....
8099	2	.....	.....	.....
3523	6	30 m. w. of Ft. Kearney.	.....	.....
8100	2	Ohio. [town.	S. M. Luther.	.....
8101	9	Little R., near Shawnee-	.....	.....
8102	17	Ruby Valley.	Capt. J. H. Simpson.	.....
8103	10	Hudson River, Albany.	Dr. J. Lewis.	.....
8104	8	St. Louis, Mo.	.....	.....
8105	3	Salisbury, Conn.	W. G. Binney.	.....
8106	8	Maine.	Dr. J. Lewis.	Var.
8107	5	Yellowstone River?	Col. A. Vaughan.	.....
8515	3	New York.	Dr. J. Lewis.	Cabinet series.
8517	1	Hiram, Ohio.	.....	" "
9208	8	Delaware River.	W. G. Binney.	.....

Physa osculans, Haldeman.—Shell ovate or subglobose, ashy-red, thin; whirls five, suture impressed; aperture wide. Shell allied to *P.*

heterostropha, and presenting nearly the same varieties; translucent; texture very thin; lines of accretion fine; aperture wide, columella thick, with the fold obsolete, or but slightly impressed. Fig. 142.

Mexico? India?

Specimens of this shell were presented to the Academy of Natural Sciences by Dr. M. Burrough, and Mexico is given as the native country, but as this enterprising traveller also made collections in India, it is not impossible that they may be from the latter country. In either case, the species appears to occur in too great abundance to allow us to suppose that it is now characterized for the first time. Fig. 13 is from a specimen in Dr. Jay's collection, and may be a distinct species. (*Haldeman.*)

Physa osculans

Physa osculans, Haldeman, Mon. p. 29, pl. ii, f. 13, excl. f. 11, 12 (= *heterostropha*) (1843).

Subsequent researches have left no doubt of the habitat being Mexico.

The specimens figured on Plate 2, Figs. 11 and 13, of Haldeman's Monograph were subsequently referred to *Physa heterostropha*. I have, therefore, retained the name *osculans* (as he suggests) for the Mexican form with narrower aperture and more pointed spire. My figure is copied from his figure 13. See also remarks under *Physa heterostropha*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8978	..	San Felipe Springs.	Beale.	.....
9009	..	Mexico.	Acad. Nat. Sc. Phila.	.....
9141	4	City of Mexico.	Lt. Beale.	.....

Physa mexicana, Philippi.—Shell imperforate, ovate, inflated, light horn-color, thin, dull and not shining, very finely wrinkled; the apical whirls occupy one-fourth of whole length; mouth wide; columellar fold broadly expanded, almost in the centre of the aperture. Fig. 143.

Shell ovate, inflated, formed by five whirls, and covered with fine broken microscopic wrinkles, parallel to the lines of growth, which prevents the surface from being shining. Whirls tolerably arched, forming a depressed suture, last whirl globose. Mouth longitudinally ovate, wide, the inner lip tolerably widely folded, the columella below the fold is appressed, prominent and rimmed—in one individual of only $6\frac{1}{2}'''$ the outer lip is furnished with a smoky, reddish thickening. Height $8\frac{3}{4}'''$, breadth $5\frac{3}{4}'''$; ap. $7'''$ long. $3\frac{1}{4}'''$ broad.

Physa mexicana.

Hab. Mexico. (*Küster.*)

Physa mexicana, Philippi in Küster, Chemn. ed. 2, p. 5, pl. i, f. 3–4.

I can give no other information regarding this species than that furnished by the original description copied above. One of Küster's figures also is given. The specimens in the collection no doubt are to be referred to the species.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8092	10	City of Mexico.	.....	.....
8093	8	Texas.	Lieut. Couch.	Cabinet series.
8519	2	City of Mexico.	.....	.....

Physa heterostropha, Say.—Shell sinistral, subovated; color pale yellow, chestnut or blackish; whirls four, the first large, the others very small, terminating rather abruptly in an acute apex; aperture large, somewhat oval, three-fourths of the length of the shell, or rather more; within of a pearly lustre, often blackish; lip a little thickened on the inside, and tinged with dull red.

Fig. 144.

Physa heterostropha, from Say's type.

Fig. 145.

Physa heterostropha, from Say's figure.

Inhabits with the first species (*L. catascopium*), and almost as numerous. Pl. 1, Fig. 6.

Animal resembles that of *Limnæa catascopium*, but is of a darker color and longer than its shell, the tentacula also are longer and setaceous; tail acute. The mantle is trifid at the base of the pillar lip, and at the upper corner of the aperture; deposits eggs the beginning of May; eggs enveloped by a transparent gelatinous substance; the nucleus, after a few days, appears of a pale or milk-white color, and not so well defined as those of *L. catascopium*. (*Say.*)

Limnæa heterostropha, Say, Am. ed. Nich. Enc. pl. i, f. 6 (1817, 1818, 1819): Binney's ed. 46, pl. lxix, f. 6.

Physa heterostropha, Say, Jour. Acad. Nat. Sc. II, 172 (1821): Binney's ed. p. 68.—Haldeman, Mon. p. 23, pl. ii, f. 1–9 (1843).—Gould, Invert. p. 211, f. 141 (1841).—Adams, Shells of Vt. 154 (1842).—Deshayes in Lam. An. sans Vert. VIII, 402; ed. 2, III, 412.—DeKay, N. Y. Moll. p. 76, pl. v, f. 82 (1843).—Chemnitz, ed. 2, p. 7, pl. i, f. 7, 8.—Mrs. Gray, Fig. Moll. An. pl. cccx, f, 9.—Potiez et Michaud, Gal. des Moll. I, 224, pl. xxii, f. 15, 16.—Anony. Canada Nat. II, 209, fig. (1857).

Physa fontana, Haldeman, Mon. pt. 2, p. 3 of cover (1841).

Physa cylindrica, Newcomb in DeKay, N. Y. Moll. 77, pl. v, f. 82 (1843).

Physa aurea, Lea, Trans. Am. Phil. Soc. VI, 18, pl. xxiii, f. 106; Obs. II, 18 (1839).—DeKay, N. Y. Moll. 80, pl. v, f. 89 (1843).

Physa plicata, DeKay, N. Y. Moll. p. 78, pl. v, f. 85 (1843).

Physa osculans, Haldeman, Mon. part, f. 11, 12.
Physa striata, Menke, Syn. Méth. ed. 2, p. 132 (1830), teste Haldeman.
Physa subarata, Menke, Syn. Méth. ed. 2, p. 132 (1830), teste Haldeman.
Physa charpentieri, Küster in Chemn. ed. 2, p. 23, pl. iv, f. 4–6.
Physa philippi, Küster in Chemn. ed. 2, p. 19, pl. iii, f. 3–6.
Physa inflata, Lea, Proc. Am. Phil. Soc. II, 32; Trans. IX, 7; Obs. IV, 7.
Helix heterostrophus, Eaton, Zool. Text-Book, 195 (1826).
Bulla crassula, Dillwyn, Conch. tab. 1, 487, No. 36 = *fontinalis*, Chemnitz, Conch. IX, 33, pl. ciii, f. 879, 880, var. 3.—Gmelin, Syst. 3407.—Schroter, Einl. t. I, 261, *Helix* No. 84.
Cochlea neritoides, Lister, Conch. pl. cxxxv, f. 34.

Of this species I have seen specimens from Texas and Georgia, and from as far north as Great Slave Lake. It ranges from the Atlantic to the Pacific. It is our most common species.

Mr. Say's types are still in the collection of the Philadelphia Academy. One is drawn in Fig. 144.

Physa fontana, formerly described as distinct, is referred to this species by Haldeman (Mon. p. 26). His description here follows:—

Physa fontana.—Animal dark fuliginous, foot as long as the shell; shell ovate, translucent, composed of three convex turns; apex eroded; suture well marked; labium nearly straight, with a slight fold; color yellowish-brown. Length $\frac{1}{4}$ inch.

Inhabits cold springs in Pennsylvania.

Closely resembles *P. fontinalis* of Europe, but the foot is shorter. (*Haldeman.*)

Among the shells figured by Haldeman as *Physa osculans* appear some of this species. He says of them:—

Physa osculans.—The United States specimens of this shell will merge into *P. heterostropha*. One specimen, supposed to be from the West, is in reality from Mexico. This appears distinct, and may retain the name until I learn more about it. Although the aperture is narrow, some specimens in the Academy's collection have it very wide.

Fig. 146.

Physa osculans.

My opinion of the identity of *Physa striata* and *Physa subarata*, of Menke, is founded on his description alone, having seen no authentic specimens. His words are:—

Physa striata, Menke.—Shell ovate, sub-opaque, reddish horn colored; last whirl longitudinally, elegantly and lightly striated; spire short, obtuse; internal margin of the labrum doubled, the exterior obsolete,

white, the interior within the throat acute, red, showing a band without. Length $6\frac{1}{2}$, breadth 4 lines.

Hab. Goshen, Mass. (*Menke.*)

Physa subarata.—Shell ovate, pellucid, ashy horn-color; last whirl ventricose, somewhat furrowed transversely; spire short, acute; labrum thickened within. Length 5, breadth 3 lines.

Hab. Near Cincinnati in the Ohio River. (*Menke.*)

Not having seen authentic specimens of the following species, my opinion of their identity with *Physa heterostropha* is based on a study of the original descriptions and figures here copied.

Physa cylindrica, Newcomb.—Shell remarkably solid, sinistral, cylindrical. Whirls four, rapidly diminishing to the sub-acute apex. Surface moderately smooth, and polished with incremental lines. Suture impressed; outer lip with a sinuous margin, nearly straight, forming an acute angle with the body, effuse beneath; body whirl not convex, but rather flattened and cylindrical. Aperture narrow above, moderately dilated and elongated beneath. Columella smooth, arched with a conspicuous callus reflected over the umbilicus. Light rusty, or opaque rusty white; outer lip with a rusty sub-margin within. Length 0.5, of aperture 0.35.

Fig. 147.

Physa cylindrica.

This specimen was communicated by Dr. Newcomb, who obtained it from Red Creek, Wayne County. I have received the same shell under the name of *P. elliptica*, Lea; but it does not agree with his description. (*DeKay.*)

Physa aurea, Lea.—Shell sinister, rather inflated; golden color, pellucid, shining; spire rather short; whirls four; outer lip margined; aperture somewhat inflated.

Habitat. Hot Spring, Bath County, Virginia: P. H. Nicklin. My cabinet, and cabinet of P. H. Nicklin. Diam. .3, length .5 inch.

Fig. 148.

Physa aurea.

Mr. Nicklin informed me that he found the *Physa aurea* in a little watercourse by which a hot and a cold spring discharge their mingled waters. The former exhibits a temperature of 106° and the latter of about 56° of the scale of Fahrenheit. Near the meeting of the waters, one side of the little stream is cold and the other side hot; and multitudes of these beautiful *Physæ* are to be found on both sides of the line of junction, availing themselves of the power which the locality affords them of changing their climate according to their fancy. (*Lea.*)

Physa plicata, DeKay.—Shell moderately solid, subovate, elongate, symmetrical. Whirls four to five, rapidly attenuated to the apex. Surface with equidistant, longitudinal, and obsolete inequidistant transverse raised

lines; suture distinct. Pillar-lip with a broad nacreous deposit. Aperture more than two-thirds of the total length, acutely oval. Amber, but coated with a black pigment; before this is removed, the aperture is bluish iridescent. Length 0.6–0.8, of aperture 0.2–0.3 inch.

Fig. 149.

Physa plicata.

This description is from specimens of the largest size, obtained from a pond on New York Island. It moves like *P. heterostropha*, with great celerity on the surface of the water, with its mouth downward. In some specimens the revolving and longitudinal lines are so distinct, particularly the former, that the surface of the body whirl appears covered with distinct square facets. Some naturalists consider it only a variety of *heterostropha*. It differs in many important particulars from that species, but I regret that I have not been enabled yet to examine the animal. (*DeKay.*)

Physa charpentieri, Küster.—Shell ovate-conic, semi-transparent, smooth, shining, yellowish; whirls five, flattened; aperture oblique; columella subplicate, peristome thickened.

Fig. 150.

Shell small, ovate conical, very transparent, shining, smooth, dark yellow; spire depressed conical, whirls almost flat, scarcely separated by the suture, increasing moderately. The body whirl decreasing in size toward its base, which is like an inverted cone; mouth yellowish, tolerably wide, somewhat oblique; outer lip arched, acute and thickened within by a flesh-colored callus, which is visible on the exterior as a bright yellow band; columella convex, with an elevated fold, which is thin, broad, and sinuose. Height $4\frac{1}{2}$, breadth $2\frac{1}{2}$; aper. 3‴ long.

Physa charpentieri, enlarged.

Habitat. Baltimore: received by Mr. Bergrath v. Charpentier. (*Küster.*)

Physa philippi, Küster.—Shell ventricose-ovate, acute, striate, shining, diaphanous, yellowish horn color; spire short, conoid, rather acute; whirls five, rapidly increasing, convex; aperture elongate-ovate; columella concave; white, peristome sharp, with a ruddy band within.

Fig. 151.

Physa philippi, enlarged.

Resembling in its general appearance *Physa heterostropha*, and in its straight axis and edge of the aperture, yet there are differences enough to distinguish it as a distinct species. The shell is ventricose, ovate, thin, and almost transparent, with waving wrinkles and yellowish horn-color. The apical whirls are rather short, comprising almost one-third of the length of the shell, increase rapidly in size, and are flattened convex, with a somewhat deep suture; body whirl ventricose; inner lip arched, rather wide; mouth long, ovate, almost as broad as long; columella concave, white, arcuate, and separated by a sinus from the

termination of the outer lip, peristome adherent, somewhat arched, acute, with a reddish callus within. Height 7½, breadth 4; aperture 5 ″ long.

To the young of this species, or a variety, I refer a shell of which three specimens were sent to me from the Stuttgard Museum, as *Ph. heterostropha*. The shell is almost transparent, rather less ventricose, very shining, but corresponds with the above description in the form of the mouth, the axis, the reddish callus within the lip, and the curved reticulations. Height 5½, breadth 3 ″. (Fig. 5 is six times the natural size.)

Hab. North America. (*Küster.*)

Physa inflata, Lea, whose description is given below, appears to me a synonym of *Ph. heterostropha*. Fig. 152 is drawn from his type.

Physa inflata, Lea.—Shell inflated, dark, somewhat pellucid; spire somewhat elevated, acutely conical; whirls five; outer lip margined and inflated; aperture wide.

Fig. 152.

Physa inflata.

Hab. Virginia, between the Salt Sulphur and the Sweet Springs: Ph. Nicklin. My cabinet, and cabinet of Mr. Nicklin. Diam. .48, length .65 of an inch.

Two specimens were taken by Mr. Nicklin in a small stream which crosses the road in a gap in the main chain of the Alleghany Mountain between the Salt Sulphur and the Sweet Springs in Virginia. The gap is nearly level for several miles, and some of the streams run to the west and some to the east. This species seems to me to differ from any with which I am acquainted. It is perhaps most nearly allied to *P. heterostropha* (Say), but has a shorter aperture and is more inflated. (*Lea.*)

Dr. Gould tells me that a specimen of *Ph. heterostropha* in the Garden of Plants is labelled *Ph. arctistropha*, Jan. Villa (Disp. p. 32) quotes *Ph. cubensis*, Pfr., as a synonym of *Ph. heterostropha*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8047	3	Near Red River.	R. Kennicott.	.....
8048	2	Black Hills.	.....	.....
8049	5	Fort Peirce.	.....	.....
8050	31	Big Sioux.	.....	.....
8051	3	Milwaukee, Wis.	I. A. Lapham.	.....
8052	43	Mohawk, N. Y.	Dr. J. Lewis.	Vars.
8053	16	Southern Illinois.	R. Kennicott.	.....
8054	1	Toledo, O.	F. A. Bossard.	.....
8055	57	Ruby Valley. [of the Woods.	Capt. J H. Simpson, Army in Utah.	.....
8056	4	Lac des Mille Lacs to L.	R. Kennicott.	.....
8057	8	Platte River, N. T.	.....	.....
8058	11	Centre County, Pa.	.....	.....
8059	7	Mohawk, N. Y.	Dr. J. Lewis.	.....
8060	4	Chattanooga, Tenn.	A. Gerhardt.	.....
8061	9	Erie Canal, N. Y.	Dr. J. Lewis.	.....
8062	8	Nolachucky R., E. Tenn.	.....	.....
8063	6	Milwaukee, Wis.	I. A. Lapham.	.....
8064	23	Mohawk, N. Y.	Dr. J. Lewis.	.....
8065	12	Maine.	"	.....
8066	17	Northern Georgia.	A. Gerhardt.	.....
8067	10	Hiram, O.	S. M. Luther.	.....
8068	14	20 miles f. Ft. Kearney.	.....	.....
8069	11	Marietta, O.	W. Holden.	.....
8070	1	.....	.....	Fossil?
8071	10	Westfield, Mass.	Dr. J. Lewis.	.....
8072	5	Owasco Lake, near Au-	"	.....
8083	4	Hiram, O. [burn, N. Y.	S. M. Luther.	.....
8465	2	Southern Utah.	Capt. J H. Simpson.	.....
8466	80	Chiloncynck Depot.	A. Campbell.	.....
8513	2	Massachusetts.	I. Lea.	Cabinet series.
8956	1	Northern Georgia.	Dr. Jones.	.....
9090	100+	Mohawk, N. Y.	Dr. Lewis.	.....
9091	20+	Grand Rapids, Mich.	"	.....
9092	20+	Mohawk, N. Y.	"	.....
9099	3	San Francisco.	Judge Cooper.	.....
9101	1	Washington Territory.	"	.....
9104	20+	Mohawk, N. Y.	Dr. Lewis.	.....
8974	..	Lake Utah.	Capt. Burton.	.....
9179	50	Vermont.	Chittenden.	.....
8528	1	Virginia.	W. G. Binney.	*P. aurea*, Lea.
9267	2	Isle la Crosse.	R. Kennicott.	.....
9268	2	Great Slave Lake.	"	.....
9269	1	Peace River.	"	.....
9261	8	Virginia.	Dr. English.	.....
9263	3	Hell Gate River.	Dr. Newberry.	.....

Physa fragilis, MICHELS.—Shell very thin and fragile, translucent, horn-color, obliquely ovate; whirls four; last whirl campanulate, suture deeply impressed at the enlargement of the last whirl; spire usually less than one, sometimes only one-fourth part of the length of the shell; labrum very thin, advanced; labium tumid with a thin, loosely adherent lamina. Length, .55 inch; greatest breadth, .4 inch; divergence, 90°.

Fig. 153.

Physa fragilis.

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. It is very tenacious of life, at least it is not easily *starved*. Three specimens are now before us in a tumbler of water, November 10th, where they have remained since the first of July. The water has not been changed more than half a dozen

times, yet they are as brisk as when first taken; and moreover they have grown at least one-quarter. Exuviæ white, abundant, vermicular.

Cabinets of Boston Society of Natural History, Amherst and Middlebury Colleges, Mons. Largillier, S. S. Haldeman, J. W. Mighels, and C. B. Adams.

Hab. Monmouth, Maine: discovered in a mill-pond, after the water was drawn off, by Mr. N. T. True, to whom we are indebted for specimens.

This species is distinguished from *P. heterostropha* by the campanulate aperture, which is constant, shorter spire, tumid labium, and by its remarkable tenuity. (*Mighels.*)

Physa fragilis, Mighels, Proc. Bost. S. N. S. I, 49 (1841).—Mighels & Adams, Bost. J. N. H. IV, 44, pl. iv, f. 12 (1842).—Haldeman, Mon. p. 31, pl. iv, f. 11–13 (1843).—DeKay, prelim. Cat. N. Y. Moll. anno 1839, p. 32?

Dr. Foreman catalogues *Ph. fragilis* from the District of Columbia.

I have seen no authentic specimen of this species, which is admitted by Haldeman as distinct. I am inclined to believe it a variety of *Ph. heterostropha.* The original description and figure are copied above.

Physa semiplicata, Küster.—Shell ovate, shining, semi-transparent, horn-colored; whirls five, convex, regularly wrinkled or grooved, the last smooth below; aperture broad; columella concave, sub-plicate; peristome straight, acute.

Fig. 154.

Physa semiplicata.

A species readily recognized by its peculiar sculpturing; the shell is longitudinally-ovate, shining, transparent, horn-colored; the apex is somewhat depressed, obtusely ovate, whirls arched, separated by a depressed, transversely wrinkled suture; body whirl large, ventricose, rapidly decreasing towards the rounded base, with delicate incremental striæ and longitudinally grooved on its upper half; mouth moderately high, and especially towards the base, broad; outer lip thin, straight, acute, curving and obtusely rounding below; columella short, concave, folded; fold broad, rather thin, white. Height 5, breadth 3‴.

Hab. Unknown. I once received a single specimen among some small American sea shells. (*Küster.*)

Physa semiplicata, Küster in Ch. ed. 2, p. 24, pl. iv, f. 7–9.

I can give no information regarding this species further than that contained in the original description and figure copied above.

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

Mus. Cal. Ac. N. S. My cabinet.

For this curious species of *Physa* we are indebted to Dr. Veatch, who collected several specimens at Clear Lake, California, most of them, however, immature. This is the only species provided with regularly arranged costæ that I have seen, and this character alone will be sufficient to separate it from all other described species of the genus. (*Newcomb.*)

Physa costata, Newcomb, Proc. California Ac. Nat. Sc. II, 104.

I have seen no specimen of this species, that sent me by Dr. Newcomb having been lost at sea.

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

Fig. 155.

Physa solida.

This is the heaviest species known to me, and is composed of six moderately arched whirls. The surface is sometimes reticulated, owing to the striæ of growth being crossed by other lines, which are owing partly to delicate lace-like prominences, and partly to a different degree of transparency of the shell. Suture tolerably defined. Mouth longitudinally ovate, columellar fold quite indistinct; the inner lip thick, adherent, forming an umbilicus; columella arcuate. Also the outer lip is thickened just within by a brownish-red callus, which appears white from the outside. Height $7\frac{1}{4}'''$, breadth $4\frac{3}{4}'''$; mouth $4\frac{3}{4}'''$ high, $2\frac{1}{3}'''$ broad.

Hab. New Orleans: My brother.

Physa gyrina, Say, differs in having a thin, transparent shell, a shorter apex, as does also *Physa heterostropha*, Say, which has an obtuse apex; *Ph. acuta*, Dr., which resembles it in form, is smaller, thinner, and has an apex comprising only one-fourth of the whole length of the shell. (*Philippi.*)

Physa solida, Philippi in Chemn. ed. 2, p. 6, pl. i, f. 5, 6.

Of this species I have no fuller information than that contained in the original description and figure copied above.

The specific name appears to be preoccupied by Potiez and Michaud, Gal. des Moll. I, 227 (1838).

Physa virginea, Gould.—Shell slender and delicate, thin and shining, of a milk-white or porcelain-white color; spire about one-third the length of the shell, sharply pointed, of five or more moderately convex

whirls, 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 $\frac{3}{5}$, diam. $\frac{1}{3}$ inch.

Fig. 156.

Physa virginea.

Sacramento River, California: Budd.

A very well-marked species, of a porcelain-like structure and color, which appears not to be the consequence merely of blanching. It is less slender than *Ph. hypnorum*, and more like *Ph. gyrina*, Say, or *Ph. rivalis*, in form, but is a far more delicate shell, and one of the most elongated species. (*Gould.*)

Physa virginea, Gould, Proc. Boston S. N. H. II, 215 (1847); U. S. Ex. Ex. Moll. p. 120, f. 138, 138*a* (1852); Otia, 43.

Fig. 156 is drawn from a specimen lent me by Dr. Gould. Specimens have recently been added to the collection of the Smithsonian.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8122	10	San Francisco.	.....	.....
8507	..	.....	.....	.....
8569	3	River Sacramento.	.....	Cabinet series.
8728	3	San Francisco.	Rowell.	.....

Physa humerosa, Gould.—Shell subrhomboid, solid, smooth and white; spire acute; whirls five, tabulated; aperture equalling one-half to two-thirds the shell's length, rounded posteriorly; labrum expanded; columella scarcely plicate, callus hardly perforated. Length $\frac{1}{2}$ to $\frac{7}{10}$, breadth $\frac{3}{8}$ inch.

Fig. 157.

Physa humerosa.

Found by Dr. Thomas H. Webb and by W. P. Blake, in the Colorado Desert and at Pecos River.

The broadly tabulated whirls, with the acute, elevated spire, and foldless columella clearly distinguish this species. It is like *P. tabulata*, Gould, and the variety figured by Haldeman, as *P. ancillaria* (fig. 7), which he regards as a monstrosity; the deep suture and simple columella distingnish it from that species. (*Gould.*)

Physa humerosa, Gould, Proc. Bost. Soc. Nat. Hist. V, 128 (1855); Otia, 216; Pac. R. R. Rep. V, 331, pl. xi, f. 1–5; Prelim. Rep. 23 (1855).

It has also been found at San Diego. The shell figured was presented by Dr. Gould to the Philadelphia Academy.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8113	4	Des. of Colorado R., Cal.	Lt. R. M. Williamson.	Dead shells.
8114	2	Creek leading to Desert,	"	.....
3252	1	San Diego. [Cal.	P. R. R.	Cabinet series.

Physa pomilia, Conrad.—Shell with four volutions, horn-colored and polished; spire short conical; body whirl ventricose; aperture patulous. *Remark.* It resembles *Ph. heterostropha*, Say, but is much smaller and thinner.

Randon's Creek, near Claiborne, Alabama, adhering to limestone rocks. (*Conrad.*)

Physa pomilia, Conrad, Am. Journ. Sc. [1], XXV, p. 343 (1834).—DeKay, N. Y. Moll. 81 (1843).—Müller, Syn. Test. 1834 Prom. p. 35 (1836).

I have not seen this species, and have not been able to gather any further information regarding it.

Physa virgata, Gould.—Shell moderate, solid, smooth, elongate-ovate, ash-colored with longitudinal olivaceous stripes; spire elevated, acute; whirls 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 $\frac{2}{3}$, breadth $\frac{1}{4}$ inch.

Fig. 158.

Physa virgata.

Found by Dr. T. H. Webb, in the river Gila, and near San Diego.

Quite remarkable, as being the only species yet known which has variegated coloration. The stripes are found on some part of every shell, and many are prettily ornamented throughout. In size and proportions it may be compared with *Ph. microstoma*, Hald. (*Gould.*)

Physa virgata, Gould, Proc. Bost. Soc. Nat. Hist. V, 128 (1855); Otia, 216.

Also found at Los Angelos. An authentic specimen is figured above.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
4285	5	San Diego.	.....	Cabinet series.
4400	5	.....	.....	.....
8723	3	Los Angelos, Cal.	Cab. Acad. Nat. Sc.	.....

Physa troostiana, Lea.—Shell elliptical, rather thick, yellow-brown, smooth; spire obtuse; sutures slightly impressed; whirls five, slightly convex; lip margined, thickened within; aperture small ovate, contracted.

Fig. 159.

Physa troostiana.

Hab. Near Nashville, Tennessee: Dr. Troost. My cabinet, and cabinet of Dr. Troost. Diam. .25, length .45 of an inch.

This is a short obtuse species, about the size of *P. aurea*, Nob. The substance of the shell is very thick for the genus, and it is much more thickened within the margin than any species I have observed. The line along the margin of the lip is of a reddish-brown. The indentation of the columella is lower than usual. The aperture is about two-thirds the length of the shell. (*Lea.*)

Physa troostiana, Lea, Tr. Am. Phil. Soc. IX, 7; Obs. IV, 7 (1844); Proc. II, 32 (1841).

Fig. 159 is drawn from the original specimen.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9266	15	.....	.....	Teste Lea.

Physa triticea, LEA.—Shell subfusiform, pellucid, polished, reddish-chestnut; spire short, subacute; sutures sub-impressed; whirls four, sub-constricted; aperture elongate, with a line within.

Fig. 160.

Physa triticea

Shasta County, California: Dr. Trask. (*Lea.*)

Physa triticea, LEA, Proc. Acad. Nat. Sc. Phila. VIII, 80 (1856).

Mr. Lea's description is given above. My figure is drawn from a shell collected by Dr. Cooper, and determined by Mr. Lea, now in the Smithsonian collection.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9097	3	California.	Judge Cooper.	One figured. Type.
9268	3	.....	.....	.....

Physa concolor, HALDEMAN.—Shell oval, spire produced, with the apex pointed; aperture oval, narrow, with the columella fold distinct. Color honey yellow.

Fig. 161.

Physa concolor.

Characterized by a single specimen brought from Oregon by Mr. Nuttall. (*Haldeman.*)

Physa concolor, HALDEMAN, Mon. pt. III, p. 3, cover (1841); p. 30, pl. ii, f. 10 (1843).—DEKAY, N. Y. Moll. 81 (1843).

I have seen no specimens of this species. Fig. 161 is a copy of that of Haldeman.

SUBGENUS **PHYSELLA**, HALD.

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

Physa globosa. HALDEMAN.—Shell globose, translucent; spire very short and rounded; aperture very long and wide, occupying considerably

more than half the entire area of the shell; fold well marked; whirls three. Foreign Analogue. *Amphipeplea involuta.*

Fig. 162.

This small species inhabits the submerged rocks in the rapids at the mouth of Nolachucky River, in Tennessee, under such circumstances as to convince me that it does not breathe the free air. I procured but two individuals, the shells of which are sufficiently translucent to exhibit light circular dots upon the black ground of the mantle—a common character in this genus. (*Haldeman.*)

Physa globosa.

Physa globosa, Haldeman, Mon. pt. 4, p. 4 of cover (1842); p. 38, pl. v, f. 10–12 (1843); Journ. Acad. Nat. Sc. Phila. VIII, 200 (1842); Pr. A. N. Sc. I, 78 (1841).—DeKay, N. Y. Moll. p. 81 (1843).

Physella globosa, Chenu, Man. de Conch. II, 281, f. 3551.

The description and figure given above are copied from Haldeman, the latter enlarged.

Subgenus **PHYSODON**, Hald.

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

Physa microstoma, Hald.—Shell elliptic, composed of four flattened whirls, separated by a distinct but very shallow suture; substance of the shell thick; spire shorter than the aperture, and ending in a point; aperture narrow elliptic, with a continuous peritreme, and the labium much thickened anteriorly; columella with two nacreous elevations or obtuse teeth. Color light brownish-ochraceous; columella and external periodical (varicose) bands, white, whilst the corresponding internal bands are chestnut.

Fig. 163.

Physa microstoma.

Kentucky and Ohio.

This is a remarkable shell, and readily distinguished from all the American species of *Physa*, hitherto described, by the teeth upon the columella. (*Haldeman.*)

Physa microstoma, Haldeman, Mon. p. 39, pl. iv, f. 12–14 (1853); Suppl. to pt. 1, p. 2 (1840).

Physodon microstoma, Chenu, Man. de Conch. II, 481, f. 3552.

Fig. 163 is a fac-simile of one of Haldeman's. His description is given above.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9095	1	Kentucky.	Haldeman.	Type.

Spurious Species of Physa.

Physa ampullaria, Say, is mentioned by name only by Lea in Expl. of Nebraska, &c., House Doc. 2d Sess. 35th Cong. 1858–9, vol. II, pt. iii, p. 724. It may be a misprint for *ancillaria*.

Physa rivalis is catalogued without description by J. de C. Sowerby (in Richardson's Fauna Boreali-Americana, III, 315 (1836)), as is also

Physa turrita with *Physa elongata*, Say, and *Bulla hypnorum*, Linn. as synonyms.

Physa scalaris, Jay.—The shell is white, semi-transparent, and very fragile; the sutures of the whirls are very angular, and of the same character with the *Ampullaria scalaris*, D'Orb. It was presented to me by Count Castelneau, whose researches in this country will, without doubt, add much interesting matter to our knowledge of natural history.

Fig. 164.

Physa scalaris.

Hab. Everglades of Florida. (*Jay.*)

Paludina scalaris, Jay, Cat. ed. 3d, 1839, p. 112, pl. i, f. 8, 9.—Reeve, Con. Icon. fig. (1863).

Physa scalaris, Haldeman, Mon. 34, pl. iv, f. 9 (1842).

The original description and figure are given above.

This species is undoubtedly distinct from any other known, but its generic place is doubtful. It does not seem to belong in *Physa* or *Paludina*. Specimens from Tampa Bay have been received by Mr. Anthony. There is a *Physa scalaris*, Dunker.

Physa planorbula, DeKay, see *Planorbis trivolvis*.

Physa marginata, Say, is mentioned by Bell in the Canadian Geological Report for 1858, p. 252. I know of no such species.

Physa fragilis, DeKay, N. Y. Moll. Rep. 1839, 32, is mentioned by name only as a new species.

Physa fontinalis, Sheppard (Tr. Lit. and Hist. Soc. Quebec, I, 195, 1829).—Reversed, oval, transparent, smooth, horn-colored; spire short, subacute. (Near Quebec.) (*Sheppard.*) J. de C. Sowerby also quotes *P. fontinalis* without description, from Methy Lake to Bear Lake, in Richardson's Fauna Boreali-Americana, III, 315; also by G. B. Sowerby in Tankerville Cat. p. 42 (1825); by Michaud in Mag. de Zool. 1837, cl. v, p. 4, and

Physa subopaca, Sheppard (Tr. Lit. and Hist. Soc. Quebec, I, 195, 1829).—Shell reverse, oval, semi-pellucid, grayish-yellow; spire short, acute. This species is rather more common than the foregoing (*P. fontinalis*); they are often found together at the Island; it resembles *fontinalis*, but is not so transparent. It is yellow without and white within. (*Sheppard.*)

Fossil Species of Physa.

Dr. Meek gives me the names of the following fossil species:—

Physa secalina, Evans & Shumard, Pr. Phil. Ac. 1854, 156.

Physa rhomboidea, Meek & Hayden, Pr. Phil. Ac. 1856, 119.

BULINUS, Adanson.

Tentacles filiform, setaceous. Mantle simple-edged, and not reflexed over the shell. Foot long, acuminate behind.

Shell sinistrorsal, elongated, polished, thin; spire acuminated; aperture narrow, produced anteriorly; inner lip simple; outer lip acute.

Jaw (of *B. hypnorum*) strongly arched, narrow, cartilaginous, brown.

Fig. 165.

Animal of *Bulinus*.[1]

Bulinus differs from *Physa* in having a simple, unfringed mantle. The shell is also more slender and more highly polished. It is less common in North America than *Physa*, but usually appears of a large size. *Bulinus princeps*, Phillips, of Central America, and some of the South American species, are remarkably well developed.

Adanson's name *Bulinus* has priority over *Aplexa*, Fleming, and *Nauta*, Leach, and is accompanied by a careful description and excellent figure.

Bulinus aurantius, Carpenter.—Shell thin, ovate, smooth or marked with very delicate incremental striæ, orange horn colored, brownish on the spire; spire short, always eroded when adult; about seven swollen whirls; aperture somewhat dilated; lip very thin, arcuate; columella scarcely folded.

Fig. 166.

Bulinus aurantius.

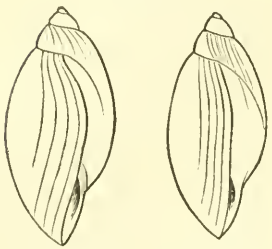
This fine species, which is generally named *Physa peruviana* in collections, is quite distinct from the types in the British Museum. It much more nearly approaches *Aplexa maugeræ*, which is believed to be a Caribbæan species (not Californian, as stated by Woodward, Man. II, 171). It differs in shape, which is never so elongated, and in color, which is almost always orange-horn, with a tendency to darker shades in rays, below the suture. Shell swollen, thin, glossy, with an extremely thin columellar lip projecting beyond the aperture, and indented at the base of the body whirl. The length of the spire varies in different specimens, as does

[1] I have been unable to obtain living specimens of a native species to figure. Fig. 165 is from Moquin-Tandon.

also the amount of convexity. The true *Aplexa peruviana* has a very prominent apex, with shouldered, swollen body whirl. Allowance must be made in the following measurements for the constant erosion of the apex. A slender specimen measures long. 1.23, long. spir. .27, lat. .63. A swollen specimen long. 1.25, long. spir. .24, lat. .7. The largest specimen must have measured 1.43; mean diverg. 60°.

Mazatlan; not common. (*Carpenter.*)

Fig. 167.



B. aurantius. *B. maugeræ.*

Aplexa aurantia, CARPENTER, Brit. Mus. Cat. of Mazatl. Shells, p. 179 (1856).
Aplexa peruviana, MENKE, CARPENTER olim, teste CARPENTER, l. c.

The shell figured above (Fig. 166) was received from Mr. Carpenter. Fig. 167 gives a comparison between *Bulinus maugeræ* and *aurantius*. They appear to me very nearly related, if not identical.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9142	1	Mazatlan.	Dr. Gould.	Fig. 166, type.
9215	4	"	Judge Cooper.	.....

Bulinus nitens, PHILIPPI.—Shell longitudinally ovate, acute, imperforate, chestnut brown, very smooth and shining; apical whirls comprising one-fourth the whole length; columellar fold rather prominent, columella short, straight, compressed.

Fig. 168.

Bulinus nitens.

It is the largest species of the genus, the whirls, five to six in number, form a conical apex, with moderate suture, the last one being inflated, smaller in the centre; a surface polished, unbroken by lines of growth, and dark brown color further characterize it; on the suture is a white band reminding one of *Natica glaucina:* columella straight, adherent, short, with a well-defined fold; inner lip thin and adherent throughout, divided into two portions, of which the lower is thicker and more expanded; no umbilicus. Long. $11\frac{3}{4}'''$, diam. $6\frac{3}{4}'''$; ap. $8\frac{3}{4}'''$ long, $3\frac{1}{2}'''$ broad.

Hab. Mexico.

Ph. peruviana, Gray, from its description, appears to resemble it nearly, but differs in having a shorter body whirl, which comprises scarcely a fifth of the whole shell's length, and the whirls are more inflated. (*Philippi.*)

Physa nitens, PHILIPPI in KÜSTER, Ch. ed. 2, p. 5, pl. i, f. 1, 2.

I have seen no specimen of this species, but do not doubt its belonging to *Bulinus*.

Bulinus elatus, Gould.—Shell lanceolate-ovate, very thin, smooth and glistening, pale horn-color, colorless at suture; spire acute; whirls nearly six, distinct, slightly convex, the last one seven-eighths the length of the shell, ellipsoidal, nearly symmetrical at the ends; aperture three-fourths the length of the shell, narrow obovate-lunate, acutely rounded anteriorly; having on the pillar an imperfect fold, and a very thin callus on the body whirl. Length seven-eighths of an inch; breadth three-eighths of an inch; length of aperture five-eighths of an inch.

Fig. 169.

Bulinus elatus.

Inhabits Lower California: Maj. Rich.

An elongated species almost as slender as *P. hypnorum*, though very much larger, highly polished, with a very long aperture; pillar region tumid. (*Gould.*)

Physa elata, Gould, Bost. Journ. Nat. Hist. VI, 379, pl. xiv, f. 4 (1853); Otia, 185.

Aplexa elata, Carpenter, Br. Mus. Cat. of Mazatlan Shells, p. 180 (1856).

A copy of Gould's description and a figure of an authentic specimen are given above.

It is the thinnest and most delicate of the North American species.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9214	1	Mazatlan.	Judge Cooper.	.....

Bulinus hypnorum, Linnæus.—Shell heterostrophe, pale yellowish, very fragile, diaphanous, oblong, whirls six or seven; spire tapering, acute at the tip; suture slightly impressed; aperture not dilated, attenuated above, about half as long as the shell; columella much narrowed near the base, so that the view may be partially extended from the base towards the apex.

Fig. 170.

Bulinus hypnorum.

Inhabits shores of Illinois. Length 7-10 inch; greatest breadth 3-10 nearly. Animal deep black, immaculate above and beneath; tentacula setaceous; a white annulation at base.

In the fragility of the shell, this species approaches nearest to *Limnæa columella*. It is very common in stagnant ponds on the banks of the Mississippi. When the shell includes the animal, it appears of a deep black color, with an obsolete testaceous spot near the base on the anterior side. Its proportions are somewhat similar to those of *P. hypnorum*. (*P. elongata, Say.*)

Physa hypnorum, Linnæus, &c.—Haldeman, Mon. 36, pl. v, f. 4–9 (1842). —Adams, Shells of Vermont, 154 (1842).

Physa elongata, Say, Journ. Acad. Nat. Sc. II, 171 (1821): Binney's ed. 68.—Gould, Inv. 214, f. 143 (1841).—DeKay, N. Y. Moll. 81, pl. vi, f. 346 (1843).—Anon. Can. Nat. II, 211, fig. (1857).

Physa glabra, DeKay, N. Y. Moll. 80, pl. v, f. 83 (1843).

Physa elongatina, Lewis, Bost. Pr. V, 122, 298 (1855).

Physa turrita, J. de C. Sowb. Fauna Bor.-Am. III, 315.

Aplexa hypnorum, Chenu, Man. de Conch. II, 481, f. 3556.

From Kansas to the District of Columbia, and from the Atlantic to the Pacific in the British Possessions, ranging as far north as Russian America. It is one of the species common to the three continents.

Mr. Say's type is still preserved in the Philadelphia Academy.

Physa turrita is quoted without description by J. de C. Sowerby in Richardson's Fauna Boreali-Americana (III, 315), with *P. elongata*, Say, and *Bulla hypnorum*, Linn. as synonyms.

Physa elongatina was proposed as a specific name for some forms of *Bulinus hypnorum* by Dr. Lewis. No description was given. Subsequently the specimens were referred to *Physa glabra*, DeKay. The description and figure of the latter now follow:—

Physa glabra, DeKay.—Shell sinistral, smooth, shining, elongated, with five to six volutions; suture impressed; spire elongated into an acute apex. Body whirl more than half of the total length. Aperture oblong, acute above, rounded beneath, and half of the total length. Columella sinuous, slightly reverted with a faint oblique fold. Deep brownish-orange, approaching to copper. Length 0.4, of aperture 0.2.

Fig. 171.

Physa glabra.

This shell, for which I am indebted to Dr. Budd, who obtained it from Lake Champlain, appears in some collections under the name of *P. aurea*, which it resembles in nothing but color. It approaches *P. elongata*, but differs in its impressed suture and the form of its columella. (*DeKay.*)

Cat. No.	No. of Sp.	Locality.	From whom received	Remarks.
8087	3	Ann Arbor, Mich.	W. G. Binney.	.....
8088	7	Westbrook, Me.	Dr. J. Lewis.	.....
8089	2	Apple Creek, lat. 47°.	.....	.....
8090	1	Yellowstone River.	.....	.....
8091	21	Grand Rapids, Mich.	Dr. J. Lewis.	.....
8094	3	Minnesota.	I. A. Lapham.	.....
8095	9	Milwaukee, Wis.	"	.....
8518	5	Massachusetts.	Dr. J. Lewis.	Cabinet series.
8972	..	Ft. Resolution.	R. Kennicott.	.....
9093	..	Grand Rapids, Mich.	Dr. J. Lewis.	.....
9100	12	Michigan.	"	.....
9102	..	Puget Sound.	Judge Cooper.	.....
9172	4	Grand Rapids. [pine.	A. C. Currier.	.....
9280	500	Yukron, m. of Porcu-	R. Kennicott.	.....
9282	7	Great Slave Lake.	"	.....

Bulinus berlandierianus.—(See Appendix.)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9308	3	Texas.	Lt. Couch.	Fig., type.

SUBGENUS **ISIDORA**, EHRENB.

Shell ovate, umbilicated; columella without any fold.

Diastropha of Guilding is also used for this subgenus. I am unacquainted with Ehrenberg's work, but have no doubt that his name is correctly used by H. & A. Adams.

Bulinus integer, HALDEMAN.—Shell oval, with a lengthened, pointed spire; whirls five, convex; suture deep; aperture obtuse posteriorly, peritreme continuous; labium not appressed anteriorly and without a fold. Color very pale yellowish-brown; labium, aperture, and varicose bands white. Sent to me from Indiana by Mrs. Say. (*Haldeman.*)

Fig. 172.

Bulinus integer.

Physa integra, HALDEMAN, Mon. No. 3, p. 3 of cover, 1841; p. 33, pl. iv, f. 7-8 (1843).—DEKAY, N. Y. Moll. 81 (1843).

Aplexus (*Isodora*) *integra*, CHENU, Man. de Conch. II, 481, f. 3556.

My figure is a fac-simile of one of Haldeman's, whose description also is given above.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8110	56	Nolachucky R., Tenn.	.....	.....
8111	6	.....	Dr. J. Lewis.	.....
8112	5	Big Sioux.	.....	.....
8514	3	Tennessee.	.....	Cabinet series.

Bulinus distortus, Haldeman.—Shell transverse, short, translucent and umbilicated; composed of three very convex whirls, and having a very deep suture; spire pointed, shorter than the aperture, which is oval, and almost cyclostomous, without any fold upon the labium or columella. Color very light yellowish-gray. Foreign analogue: *P. guildingii*, Sw.

Fig. 173.

Bulinus distortus.

Near St. Louis: Mr. Emerson. Kentucky and Ohio.

I am indebted to G. B. Emerson, Esq., President of the Boston Society of Natural History, for specimens of this curious shell, which were collected (by himself, I believe) near St. Louis. It is remarkable for the contorted spire and entire absence of a columellar fold. (*Haldeman.*)

Physa distorta, Haldeman, Mon. 35, pl. v, f. 1–3 (1842); Suppl. to pt. 1, 1840, p. 2.

Fig. 173 is a fac-simile of the outline of one of Haldeman's figures. His description is copied above.

Spurious Species of Bulinus.

Aplexa suturalis, Beck. Mexico. No description. Index, 117.

Bulinus fontinalis and var. *canadensis*, Beck; without description. Index, 117.

Bulinus pomilius, Conr., Beck, *l. c.* = *Physa.*

Bulinus crassula, Beck, p. 117; no description, and

Var. *typica* (= *P. heterostropha*);

b. *striata* (= *P. striata*, Mke.);

c. *minor* (= *P. arctistropha*, Crist. & Jan).

Bulinus subaratus, Beck, Ind. p. 118 = *Physa heterostropha?*

Bulinus gyrinus, Beck, *l. c.* 118 = *Physa gyrina.*

Bulinus maugeræ. See *Bulinus aurantius.*

Fossil Species of Bulinus.

Dr. Meek furnishes me with the following list:—

Aplexa longiuscula, Meek & Hayden, MSS. (*Physa longiuscula*, Pr. Phila. Acad. 1856, 119.)

Aplexa subelongata, Meek & Hayden, MSS. (*Physa subelongata*, Pr. Phila. Acad. 1856, 120.)

PLANORBIS, Guettard.

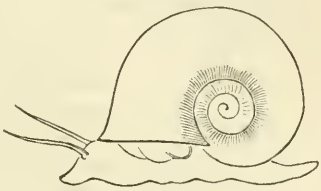
Fig. 174.

Animal of *Planorbis bicarinatus.*

Tentacles slender, filiform. Foot short, ovate.

Shell dextral, discoidal; spire depressed, whirls numerous, visible on both sides; aperture crescentic, or transversely oval; peristome thin, incomplete, the upper margin produced.

Fig. 175.



Animal of *Planorbis.*

Jaw single, superior, arched.

Lingual membrane — ?

The genus *Planorbis* is widely distributed over the globe, but usually prefers the more temperate regions. It is found in every part of this continent, reaching into Mexico, and apparently much more abundant there than the other genera of the family.

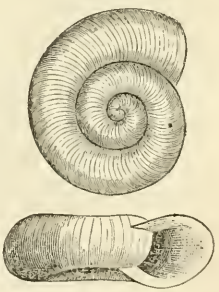
Most of the sections or subgenera are represented in North America. The South American *Taphius* is most nearly allied to the *Carinifex* of the Pacific coast.

The name *Planorbis* is now universally applied to the genus.

The species of this genus have a dextral shell, but the orifices of the generative, excretory, and respiratory organs are on the left of the animal, as in *Physa.* They are sluggish in their habits, preferring stagnant pools.

Say considered the shells sinistral, a fact which must be borne in mind while studying his descriptions. On this account I have represented the facsimiles of his figures in a different position from those of other authors.

Fig. 176.



Planorbis subcrenatus.

Planorbis subcrenatus, Cpr.—Shell tumid, very thin, horn-colored; whirls six, rounded, sutures impressed; with sharp radiating, somewhat crowded and occasionally minutely crenulated, ridges; aperture rounded, parietal wall small, scarcely touching the penultimate whirl; labrum slightly deflected, fuscous within; umbilicus deep. Long. .05, lat. .08, alt. .36. 8

Oregon. T. Nuttall collected a single specimen.

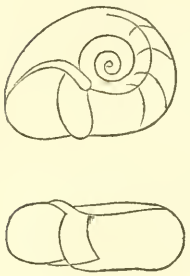
"Differs from *Pl. trivolvis*, Say, in the acuteness of the ribs, and in their being more distant." Cuming MS. (*Carpenter.*)

Planorbis subcrenatus, CARPENTER, Proc. Zool. Soc. 1856, p. 220.

The above is the original description of Mr. Carpenter. The specimen from which it was drawn is figured in my Fig. 176. It has been found in Washoe (*Newcomb*).

Planorbis lentus, SAY.—Shell dull brownish or yellowish-brown, sub-carinate above, particularly in the young shell; whirls nearly five, striate across with fine raised, subequidistant lines, forming grooves between them; spire concave; aperture large, embracing a large portion of the penultimate volution; labrum more acutely but not very prominently arcuated above, its basal portion horizontally subrectilinear, in the adult, and not extending below the level of the base.

Fig. 177.



Planorbis lentus.

I obtained this species in the canal at New Orleans, and am indebted to Mr. Maclure, and also to Mr. Barabino, for many fine specimens collected in the vicinity of that city. I also found the same species at Ojo de Agua, Mexico, when travelling in that country with Mr. Maclure. It differs from the *P. trivolvis* in having the labrum less prominent above, and the basal portion of this part being in the adult horizontally subrectilinear, so as not to touch a plane on which the base of the shell may rest; the aperture also is more transverse. (*Say.*)

Planorbis lentus, SAY, Am. Conch. pt. 6, pl. iv, f. 1 (1834): BINNEY'S ed. 210, pl. iv, f. 1.—HALDEMAN, Mon. 18, pl. iii, f. 4–6 (1844).—DEKAY, N. Y. Moll. 60, pl. v, f. 80*, *a*, *b* (1843).—ANON. Can. Nat. II, 203 fig. (1857) (not GLD. =*fallax*).

Fig. 177 is a fac-simile of that of Mr. Say, whose description also is given above.

It is said to have been found at several points between New Braunfels, Texas, and South Carolina, and in New York.

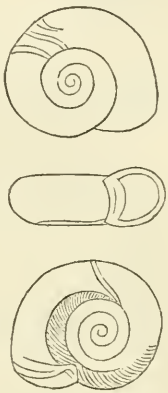
Prof. Adams refers the species to *Pl. corpulentus* in the List of Middlebury Shells, to *trivolvis* in the Shells of Vermont.

Gould's description and figure of *Pl. lentus* is referred by Haldeman to *Pl. fallax.*

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8178	3	Yellowstone River.	.....	.....
8198	40	Big Sioux.	.....	.....
8496	3	.....	W. G. Binney.	Cabinet series.
9184	2	South Carolina.	Gen. Totten.	.....
9186	5	Lynn, Mass.	Dr. Prescott.	.....

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

Fig. 178.



Planorbis tumidus.

Shell rather large, and somewhat shining, pale horn-colored, or sometimes reddish-brown or greenish, thick and delicately grooved; concave and deeply umbilicated in the centre above, as also below, without the well-defined umbilicus, so that the apical whirls are visible; whirls five or five and a half rapidly increasing, separated by a deep suture, and obsoletely grooved above and below; mouth oblique, roundly-lunate and somewhat obtusely angular; columella simple, covered with a thin white callus. Greater diameter of the largest specimen 9 lines, height at the aperture 3 lines.

Hab. Common at San Juan (Pfeiffer), Havana (de la Sagra), swamps at Vera Cruz and Vamba (Leebmann, Hegewish), Mexico (D'Orbigny).

Nearly allied to *Plan. tenagophilus*, D'Orb. Young specimens resemble a flat form of *Pl. trivolvis*. Some kindly sent by Prof. Steenstrup, of Copenhagen, are characterized by stouter, smaller shell, and finer grooves, and also paler color (pl. v, f. 1–3) (*Küster, l. c.*).

Planorbis tumidus, Pfeiffer in Wiegm. Archiv. 1839, 354; in Küster, Ch. ed. 2, p. 39, pl. vii, f. 10–12; pl. ix, f. 1–3.

Planorbis caribæus, Orbigny, Sagra's Cuba, 193, pl. xiii, f. 17–19.

Planorbis intermedius, Philippi, Conch. Cab. I, tab. i, 17, 16, f. 18, 19.

Var. fig. malac. an. *Plan. capillaris*, Beck? Ind. p. 110.

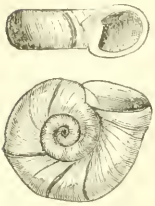
Guatemala: Rev. H. B. Tristam. The description and figures given above are copied from Chemnitz, ed. 2.

I have followed Küster in quoting the synonymy of this species.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8174	4	Texas.	Lt. Couch.	"Forests."
8175	8	"	G. Wurdeman.	.....
8176	11	"	" & Dr. Ber-	.....
8177	29	"	Lt. Couch. [landiére.	.....
8502	..	"	"	Cabinet series.

Planorbis glabratus, Say.—Shell sinistral; whirls about five; glabrous or obsoletely rugose, polished, destitute of any appearance of carina; spire perfectly regular, a little concave; umbilicus large, regularly and deeply concave, exhibiting all the volutions to the summit; aperture declining, remarkably oblique with respect to the transverse diameter. Breadth nearly nine-tenths of an inch.

Fig. 179.



Planorbis glabratus.

Inhabits South Carolina. Cabinet of the Academy.

Presented to the Academy by Mr. L'Hermenier, of Charleston, an intelligent and zealous naturalist. He assured me that this species inhabits near Charleston. It somewhat resembles large specimens of the *P. trivolvis*, of the American edition of Nicholson's Encyc., but differs in the total absence of carina, and in having a more smooth and polished surface, as well as a declining and more oblique aperture, and a more profound and much more regularly concave umbilicus. (*Say.*)

Planorbis glabratus, Say, Jour. Acad. Nat. Sc. I, 280 (1818); Nich. Enc. 3d ed. (1819): Binney's ed. p. 51, 61.—Haldeman, Mon. 11, pl. ii, f. 1-3 (1844).—DeKay, N. Y. Moll. 66 (1843).

It is said to be found in Mexico, Louisiana, and Oregon, which, with Say's locality, gives a wide range to this species.

My figure of *Pl. glabratus* is drawn from a specimen corresponding with that figured by Haldeman, and generally acknowledged to be this species.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8195	17	St. Simon's Island, Ga.	Dr. J. Lewis.	.....
8500	5	"	"	Cabinet series.

Fig. 180.

P. tumens.

Planorbis tumens, Carpenter. — Shell rapidly swelling, small, horn or reddish smoke-colored; whirls 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.

This species is so variable that it is difficult to describe it so as to include all the specimens and yet separate it from its congeners. Aberrant individuals on the one side closely approach *P. affinis*, on the other *P. lentus*, Say. The three may hereafter be proved identical; but the general habit of *P. tumens*, as gathered from repeated examinations of many hundred specimens, is sufficiently distinct from the Jamaica

species. The whirls are more rapidly enlarging, more swollen, and the lip more shouldered. An unusually large specimen measures long. .63, lat. .58, alt. .27.

Hab. Mazatlan; not uncommon. Liverpool collection. (*Carpenter.*)

Planorbis tumens, Carpenter, Brit. Mus. Mazatlan Cat. 181.

Planorbis affinis, Carpenter in Cat. Prov. (not Adams).

Planorbis tenaglophilus, Menke, Zeit. f. Mal. 1850, p. 163 (not D'Orbigny, teste Carpenter).

Fig. 180 is drawn from a specimen received from Mr. Carpenter. The original description is given above.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9125	5	San Francisco.	Judge Cooper.	.....
9121	11	Petaluma.	Dr. Gould.	Type.
9146	1	.....	"	Figured. Authentic.

Planorbis havanensis, Pfeiffer.—Shell discoid, thin, pale horn-colored or yellow, very delicately and densely striate; above and below planulate, and having an umbilicus in the centre; whirls five, subrotund, moderately increasing, separated by a deep suture; aperture oblique, roundly lunate.

Fig. 181.

Planorbis havanensis.

Shell discoid, thin, fragile, pale horn or yellowish in color, with very delicate and numerous striæ; both above and below flattened and umbilicate in the centre, but somewhat more deeply so above; whirls five, regularly increasing, rounded, separated by a tolerably deep suture; aperture oblique, round, somewhat lunate. Diam. (greatest of largest specimen) about 4 lines, height $1\frac{1}{3}$.

Received from Herr Dr. L. Pfeiffer, who found it in swamps near Havana. Also from Dr. F. Röemer, who found it in Texas.

It has many analogies with *Pl. peregrinus*, D'Orb., of Chile. (*Küster.*)

Planorbis havanensis, Pfeiffer in Wiegm. Arch. f. Nat. 1839, I, p. 354. —Küster in Chemnitz, ed. 2, p. 58, pl. x, f. 32–34.

Planorbis terverianus, D'Orbigny, Voy. Cub. 194, tab. xiii, f. 20–23.

I have seen no specimen of this species; the above extracts and figures are from the second edition of Chemnitz.

The following is Pfeiffer's description:—

Planorbis havanensis.—Shell discoidal below, above more concave, light horn-color; whirls four, regularly increasing, terete; aperture lunate. Diam. 5, alt. $1\frac{1}{2}'''$. (*Pfeiffer.*)

Planorbis liebmanni. Dunker.—Shell discoidal, pale horn-colored, subvitreous, substriate, almost smooth, shining, flattened above, concave below, umbilicated on both sides; whirls four, convex, moderately increasing; aperture per-oblique, slightly dilated, rather rounded, almost heart-shaped.

Fig. 182.

Planorbis liebmanni.

Shell discoid, light horn-colored, very delicately striate, almost smooth, very transparent and shining; flat or slightly convex above, below somewhat concave; umbilicate on both sides; whirls four, rounded, slightly involute, compact, separated by a somewhat deep suture; aperture very oblique, somewhat widened, irregularly rounded, almost heart-shaped. Greatest diam. 3½ lines, height hardly 1 line.

Hab. Vera Cruz: Herr Prof. Liebmann, of Copenhagen.

Specimens kindly furnished by Herr Prof. Steenstrup, of Copenhagen, have a hard, firm, chalky incrustation. (*Dunker.*)

Planorbis liebmanni, Dunker in Chemn. ed. 2. p. 59, pl. x, f. 32–34.
Planorbis gracilentus, Gould, Pr. Bost. Soc. V, 129 (1855); Otia, 217.

Römer (Texas) quotes it from New Braunfels. The above description and figure are from Chemn., ed. 2.

Planorbis gracilentus, Gould, appears to be identical with this species. It is, at least, the same as the shells in Nos. 8179, 8180, and 8504, which I have referred to *Plan. liebmanni* after a study of the description and figures copied above. No. 9205, from the Colorado Desert, is an authentic specimen of Gould's *Pl. gracilentus*. His description here follows, and an enlarged drawing of a specimen received from him. Dr. Gould suggests its identity with *Pl. haldemani*, but the aperture of that species is campanulate.

Planorbis gracilentus, Gould.—Shell discoidal, compressed, white, finely striated; right side flattened; left side moderately concave; on each side four rounded whirls, the last obtusely carinated at the periphery; aperture quite oblique, roundedly oval. Axis ⅛, diam. ½ inch.

Fig. 183.

Planorbis gracilentus.

Found by Dr. T. H. Webb, in the great Colorado Desert low lands.

No North American species, of equal size, can be compared with this well-marked, wheel-shaped species. Very small specimens are like large specimens of *P. deflectus*, Say. A species from the Nile is very similar. (*Gould.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8179	2	Texas.	G. Wurdeman.	.....
8180	25	"	Lieut. Couch.	.....
8504	8	"	"	Cabinet series.
9205	1	Colorado Desert.	A. A. Gould.	(Type of *Pl. gracilentus* figured.)

Subgenus **PLANORBELLA**, Hald.

Shell with the whirls few; aperture campanulate or bell-shaped, prominent.

Planorbis campanulatus, Say.—Sinistral; whirls longer than wide; aperture sub-campanulate.

Inhabits Cayuga Lake. Cabinet of the Academy.

Shell sinistral, not depressed; whirls four, slightly striate across; longer than wide; spire hardly concave, often plane; body whirl abruptly dilated near the aperture and not longer behind the dilatation than the penultimate whirl; suture indented, well defined to the tip, the summits of the volutions being rounded; aperture dilated; throat narrow abruptly; umbilicus profound, the view extending by a minute foramen to the apex. Greatest length of the body whirl one-fourth of an inch; breadth from tip of the labrum one-half of an inch; at right angles to the last, two-fifths of an inch.

Fig. 184.

Planorbis campanulatus.

This shell abounds in some of the small streams which discharge into Cayuga Lake, where it was collected by Mr. Jessup, who presented specimens to the Academy and to me. It is readily distinguished from other species, by the sudden dilatation of the outer whirl, near the aperture in the adult shell, forming a large oval chamber. The summit of the outer whirl, behind the dilated portion, is not, or hardly elevated above the summits of the other volutions. (*Say.*)

Planorbis campanulatus, Say, Jour. Acad. Nat. Sc. II, 166 (1821): Binney's ed. p. 64.—Haldeman, Mon. 9, pl. i, f. 7–11 (1844).—Gould, Invert. 204, f. 133 (1841).—Adams, Shells of Vt. 155 (1841).—De Kay, N. Y. Moll. 61, pl. v, f. 99* *a*, *b* (1843).—Küster in Chemn. ed. 2, p. 52, pl. ix, f. 7–10.—Anon. Can. Nat. II, 204, fig. (1857).

Planorbis bellus, Lea, Tr. Am. Phil. Soc. IX, 6 (1844); Proc. II, 32 (1841).

Planorbis bicarinatus, Sowerby, Gen. pl. iv.

Planorbella campanulata, Chenu, Man. de Conch. II, p. 482, f. 3559.

Helix angulata, Sheppard, teste J. de C. Sowerby, Fauna Boreali-Americana, III, 315.

It ranges from New England through the northern tier of States to Minnesota.

My decisions in regard to the synonymy of this species are based on actual examination of Mr. Lea's type of *Pl. bellus*, which is an immature shell, and the description copied below.

Planorbis bellus, Lea.—Shell orbicular, above regularly concave, beneath widely umbilicate, greenish-yellow, closely and beautifully striate; whirls four, carinate above, sub-carinate below; lip sharp, aperture small, within reddish-brown.

Hab. Tennessee: Dr. Troost. My cabinet, and cabinet of Dr. Troost. Diam. .40, length .22 of an inch.

A single specimen only of this species was received from Dr. Troost. Like the *P. corpulentus* (Say), it is covered with striæ, but in the *bellus* they are much closer and more regular. It is a much less inflated shell, and more regular in its form. (*Lea.*)

Planorbis bicarinatus of Sowerby's Genera of Shells seems to represent this species rather than *bicarinatus*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8199	3	Milwaukee, Wis.	I. A. Lapham.	.....
8201	2	Lake of the Woods.	R. Kennicott.	.....
8202	1	Quasquitau, Ia.	E. C. B.	.....
8203	1	Big Sioux.	.....	.....
8204	3	San Cloud, Min.	R. Kennicott.	.....
8205	11	Little Lakes, N. Y.	Dr. J. Lewis.	.....
8206	35	.....	.....	.....
8207	1	Aztalan, Wis.	S. F. Baird.	.....
8495	3	Michigan.	W. G. Binney.	Cabinet series.
9178	100+	Vermont.	Chittenden.	.....
9181	5	Lynn, Mass.	Dr. Prescott.	.....
9281	9	Otter Tail Creek, Min.	R. Kennicott.	.....
9266	4	Great Slave Lake.	"	.....

Planorbis haldemani, Dunker.—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; whirls five, oval, rather involute; aperture ovate heart-shaped, dilated, almost campanulate.

Fig. 185.

Planorbis haldemani.

Shell discoidal, flat, rather solid, delicately striate, very slightly concave above and below, as well as almost flat, with a pit in the centre. Whirls five, moderately increasing, not very involute, ovately-rounded. Aperture oval, almost heart-shaped, widened, resembling that of *Plan. campanulatus*, which is bell-shaped. Greatest diam. 6 lines, height almost 2 lines.

Mexico: Prof. Liebmann.

The specimens are worn, but apparently were pale horn-colored when fresh. (*Küster.*)

Planorbis haldemani, DUNKER in CHEMN. ed. 2, p. 59, pl. x, f. 38–40 (not ADAMS).

The above are copies of the original description and figures of this species.

The name has been used by Adams, Contr. to Conch. III, 43, Oct. 1849. This will probably necessitate another name for Dunker's shell. I cannot ascertain the date of his description in the second edition of Chemnitz.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8196	31	Lake Aculeo, 30 m. S. S. W. of Santiago.	.....	"Thrown upon the beach."
8499	3	Lake Aculeo, 30 m. S. S. W. of Santiago.	.....	Cabinet series.

SUBGENUS **ADULA**, H. ADAMS.

Shell with the whirls rounded and numerous, deeply umbilicated on the upper, and convex on the under side; aperture campanulate.

Planorbis multivolvis, CASE.—Shell about five-eighths of an inch in diameter; whirls seven, about half the last whirl overlapping the preceding one, sometimes the last whirl suddenly distorted and expanded for the last half of its length; right side concave, left side slightly acuminate and considerably carinate; throat campanulate; aperture opening towards the left, but projecting on both sides beyond the preceding whirl.

Fig. 186.

Planorbis multivolvis.

This shell, also, I obtained from Captain Stanard, who found it in the northern part of Michigan. It is very distinct from any *Planorbis* I have met with, or have been able to find any description of. I have named it from its strong characteristic—a greater number of whirls than usual in the genus. (*Case.*)

Planorbis multivolvis, CASE, Am. Journ. Sc. [2], III, 101, f. 4, 5 (1847).

Adula multivolvis, H. ADAMS, Proc. Zool. Soc. Lond. 1861, p. 145.

I have heard of this very peculiar species being found at no other locality. No. 9122 of the collection was received from Mr. Case by Dr. Gould, and by him presented to the collection. The original description and figure are given above.

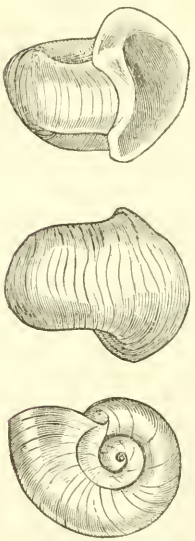
Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9122	1	.....	Dr. Gould.	.....

SUBGENUS **HELISOMA**, SWAINS.

Shell ventricose, the spire sunk below the body whirl; whirls few, often angulated.

Planorbis ammon, GOULD.—Shell large, discoid, subconic, delicately striate; left side broadly and deeply concave, showing four obtusely carinated whirls; right side concave, showing two and a half rounded whirls; aperture ovate-triangular, sometimes quite expanded on each side; axis $\frac{5}{8}$ to 1, diam. $\frac{1}{4}$ to $\frac{1}{2}$ inch.

Fig. 187.



Planorbis ammon.

Found by Dr. T. H. Webb, in the Cienaga Grande, or Colorado Low Desert, and also by Mr. W. P. Blake.

The specimens differ greatly in size, and 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. Fully developed specimens are much like *P. corpulentus*, Say, but the shape of the volution and aperture differ, and the striæ are less coarse, and more like *P. glabratus*, Say. (*Gould.*)

Planorbis ammon, GOULD, Proc. Bost. Soc. Nat. Hist. V, 129 (1855); Otia, 216; Pac. R. R. Rep. V, 331, pl. xi, f. 12–18 (1857); Prel. Rep. 23 (1855).

Planorbis traskii, LEA, Pr. Phil. Acad. Nat. Sc. 1856, VIII, 80.

It is also said to have been found in lagoons, Sacramento Valley, and Ocogo Creek, California. Fig. 187 is copied from those of Gould.

No. 9169 of the collection was labelled "*P. traskii*," by Dr. Trask. It appears to be identical with Gould's shell. Fig. 188 is drawn from Mr. Lea's original specimen of *P. traskii*, and his description is given below.

Planorbis traskii, LEA.—Shell large, dark horn-colored, subcylindraceous, minutely, regularly and closely striated, deeply and broadly umbilicated above; more excavated below; whirls five, acutely carinated at the periphery above, obtusely carinated below; aperture ear-shaped.

Kern Lake, Tulan Co., California: Dr. Trask. (*Lea.*)

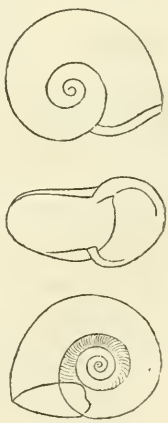
Fig. 188.

Planorbis traskii.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8576	3	Ocogo Creek, Cal.	Lt. R. S. Williamson.	"Varying from type," A. A. G. Cab. ser.
9124	1	Kern Lake, Cal.	Dr. Cooper.	(Sub nomine *traskii*.)
9169	1	Monterey County, Cal.	Dr. Trask.	"
9258	7	Klamath Lake, Or.	Newberry.	.....
9260	7	Rhett Lake, Cal.	"	.....
9317	12	E. of Ft. Colville, W. T.	N. W. Boundary Surv.	.....

Planorbis tenuis, PHIL.—Shell large, thin, rather shining, very delicately striate, pale horn or smoke-colored; concave on each side, umbilicated above, deeply excavated below; whirls swollen, rounded, above narrow, subcarinated below and rapidly increasing; aperture sinuous, sub-auriculate. (*D.*)

Fig. 189.



Planorbis tenuis.

Shell large, very thin, densely and sharply grooved, transparent, pale horn-color, yellowish or sometimes reddish-brown, not very highly polished; five rapidly increasing involute whirls, rounded and ventricose above, below narrow and grooved near the suture; carina usually more prominent on the inner whirls, being often obsolete on the body whirl. Upper side umbilicated, so that the deeply depressed first whirl is covered by the rest; the under side, on the other hand, is almost funnel-shaped, yet flat in the middle. The auricular aperture is somewhat raised above; the parietal wall has a very delicate callus. Breadth 7–9 lines, height $3\frac{2}{3}$–5 lines.

Common among graves near Mexico, with *Limnæus subulatus*, Dkr.: Schiede and David.

Resembles *Plan. peruvianus*, Brod., which has a smaller, thicker shell, and very thick and broad lip. (*Küster.*)

Planorbis tenuis, PHILIPPI, Conch. tab. I, 17, 16, f. 23–25.—KÜSTER in CHEMN. ed. 2, 45, pl. ix, f. 14–19.

Planorbis mexicanus, ZIEGLER in litt.

The above description and figure are copied from Chemnitz, ed. 2.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8172	7	City of Mexico.	Maj. Rich.	.....
8506	5	"	"	Cabinet series.

Planorbis corpulentus, Say.—Shell dextral; whirls more than three, rather rugged with coarse wrinkles, much higher than wide; superior surface much flattened, and edged by an abrupt acute line, which is distinct to the aperture; sides hardly rounded and terminating below by another abrupt edge, which is not quite so definite and acute as the superior one; spire slightly concave; umbilicus exhibiting a portion of each of the rapidly retiring whirls to the apex; aperture longer than wide, the superior part extending higher than the preceding volution, and the inferior volution declining much lower than the inferior line of the same volution. Greatest breadth three-fourths of an inch; length of aperture nearly half an inch; length of the penultimate whirl near the aperture rather more than three-tenths of an inch.

Fig. 190.

Planorbis corpulentus.

Inhabits Winnepeck River, Winnepeck Lake, Lake of the Woods, and Rainy Lake: common.

Of this species I collected numerous specimens, but had the misfortune to lose them all, as well as a great number of interesting terrestrial and fluviatile shells, on our return to the settlements, and I am indebted to the liberality of Dr. Bigsby for the individual above described. It is closely allied to *trivolvis*, Nob., but is much less rounded on the sides of the whirls, the carinæ are more prominent, the upper side is much more horizontally flattened, the labrum is less rounded, and the whole shell is larger and higher in proportion to its width, and the aperture extends both above and below the penultimate whirl. (*Say.*)

Planorbis corpulentus, Say, Long's Ex. II, 262, pl. xv, f. 9 (1824): Binney's ed. p. 128, pl. lxxiv, f. 9.—? Haldeman, Mon. 19, pl. iii, f. 7–9 (1844).—? Gould, U. S. Ex. Ex. Moll. 114, f. 130, 130 *a*, 130 *b* (1852).

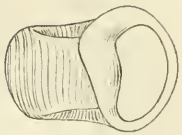
?*Helisoma corpulenta*, Chenu, Man. de Conch. II, 482, f. 3560.

Animal dark emerald green, profusely dotted above and below with small white points, paler beneath. Head large, tentacles very slender. (*Gould.*) See Fig. 175, p. 103.

I am inclined to believe that Say had before him a form of *Plan. trivolvis* when he drew his description of *Plan. corpu-*

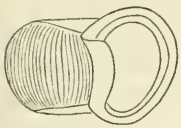
lentus. His original description and figure are given above. Large globose forms of *Pl. trivolvis* are usually called *Pl. corpulentus* in collections, and have often been so labelled in the envois of my correspondents. DeKay also describes and figures a specimen of *P. trivolvis* as *Pl. corpulentus*. Adams (Shells of Vt.) refers *P. corpulentus* to *Pl. trivolvis*, and so Gould appears to decide in the Invert. of Mass. I have myself seen no specimens from the localities visited by Mr. Say while on Long's Expedition that are not forms of *Pl. trivolvis*.

Fig. 191.



Form of *Pl. corpulentus*.

Fig. 192.



Form of *Pl. corpulentus*.

The shells referred to *Pl. corpulentus* by Haldeman in his Monograph, by Gould in the Exploring Expedition Mollusca, and figured by Chenu (*l. c.*), and referred to in the following museum register, are all from the West Coast. I believe them to be distinct from *Pl. corpulentus* of Say, and that they should receive another specific name. The description of the animal given above is drawn from one of this form. One of Haldeman's figures is copied in my Fig. 192. It will be found to agree with Fig. 191, drawn from one of the specimens in the Smithsonian collection, No. 8119. A curiously indented form from the West Coast is figured in Fig. 193.

Fig. 193.

Form of *Pl. corpulentus*.

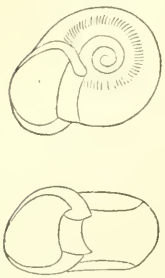
P. corpulentus is catalogued from Guatemala by Mr. Tristam.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8116	1	Pacific Coast.	.....	.....
8117	12	"	.....	.....
8118	8	Columbia River, Or.	Com. Wilkes.	.....
8119	5	" ?	.....	.....
8120	14	Pacific Coast.	.....	Young.
8121	..	"	.....	.....
8460	..	Columbia River, Or.	Com. Wilkes.	Animal in alcohol.
8498	2	.....	J. G. Anthony.	Cabinet ser.
8575	4	Columbia River, Or.	Com. Wilkes?	" W. C.
9119	1	Washington Territory	"	Fig. 193.

Planorbis trivolvis, Say.—Shell sinistral, pale yellow, brownish or chestnut color, subcarinate above and beneath, particularly in the young shell; whirls three or four, striate across with fine, raised, equidistant, acute

lines, forming grooves between them. Spire concave; aperture large, embracing a considerable portion of the body whirl, within bluish-white; lip a little thickened internally, and of a red or brownish color, vaulted above; umbilicus large, exhibiting the volutions. Length one-fourth of an inch; breadth one-half of an inch. Animal aquatic, dark ferruginous, with very numerous, confluent, pale yellowish points; tentacula long, setaceous, with confluent points; foramen on the left side.

Fig. 194.



Planorbis trivolvis.

That ingenious naturalist, Mr. C. A. Lesueur, found this species of a much larger size in French Creek, near Lake Erie; breadth three-fourths of an inch nearly; color almost black, purplish-red within the mouth.

Lister (*Cochlea trium orbium*, Lister, Conch. tab. cxl, f. 46) figures this shell pretty accurately, and it is referred to in Gmelin's edit. of Syst. Nat. p. 3615, as *albella*, but it is certainly not that species. (Petiver, Gazophyl. pl. cvi, f. 17.)

This is an inhabitant of the Middle and Northern States, and is very common in many districts. I have found it in Pennsylvania, New Jersey, Delaware, Maryland, Falls of Niagara, Upper Canada, and in the vicinity of Council Bluff on the Missouri. Dr. Eights sent me specimens from Albany, New York, and Mr. Jessup gave several from Cayuga Lake. Lister gives two pretty good figures of this shell, and quotes Virginia as the native locality. Muller, Gmelin, and Dillwyn incorrectly referred to Lister's figures as *Helix albella*; but the latter author, in his edition of Lister, agrees with us in considering them as representations of the present species. (*Say.*)

Planorbis trivolvis, Say, Nich. Ency. pl. ii, f. 2 (1817, 1818, 1819); Am. Conch. pt. 6, pl. liv, f. 2 (1834): Binney's ed. p. 44, pl. lxx, f. 2; pl. liv, f. 2.—DeKay, N. Y. Moll. 59, pl. iv, f. 59, *a*, *b* (1843).—Gould, Inv. of Mass. 201, f. 131 (1841).—Haldeman, Mon. 13, pl. ii, f. 4-7 (1844).—Adams, Shells of Vt. 154 (1842).—Küster in Chemn. ed. 2, p. 53, pl. v, f. 4-6; pl. vi, f. 1-6, 20-25.—Potiez et Michaud, Gal. des Moll. I, 214, pl. xxi, f. 19-21.—Anon. Can. Nat. II, 202, fig. (1857).

Bulla fluviatilis, Say, Jour. Acad. Nat. Sc. II, 178: ed. Binn. 71.

Planorbis regularis, Lea, Tr. Am. Phil. Soc. IX, 6; Proc. II, 32 (1841); Obs. IV, 6.

Planorbis megastoma, DeKay, N. Y. Moll. 61, pl. iv, f. 60, 61 (1843).

Physa planorbula, DeKay, N. Y. Moll. 76, pl. v, f. 83 (1843).

Planorbis corpulentus, DeKay, N. Y. Moll. 64, pl. xiii, f. 185 (1843).—Whittemore, Am. Journ Sc. [1], XXXVIII, 193.

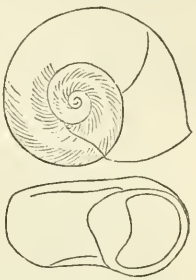
?*Planorbis proboscideus*, Potiez & Michaud, Gal. des Moll. I, 213, pl. xxv, f. 13-15 (1838).

Planorbis macrostomus, Whiteaves, Can. Nat. VIII, 113, fig. (1863).

Planorbis trivolvis, var. *fallax*, Haldeman, Mon. 15, pl. iii, f. 1–3 (1844).
Planorbis lentus, Gould, Inv. 202, f. 132 (1841).
Helix trivolvis, Eaton, Zool. Text-Book, 194 (1826).
Cochlea trium orbum, Lister, Conch. pl. cxl, f. 46.—Petiver, Gazophyl. pl. cvi, f. 16.

This species probably inhabits all of the United States and Canada. It has been found at Fort Simpson, to the Red River of Louisiana, from Puget Sound to San Diego, in Utah, and from New England through the Western and Middle States. Pocy catalogues it among the Cuban shells.

Fig. 195.



Planorbis trivolvis.

Fig. 195 is a better representation of the species than the fac-simile of Mr. Say's figure given in Fig. 194.

I give below the original descriptions of the synonyms of this species. Of these *Physa planorbula*, *Bulla fluviatilis*, and *Planorbis regularis* are immature forms. *Plan. megastoma* and *Plan. macrostomus* are an overgrown form or monstrosity. All the following figures are fac-similes excepting Fig. 196, which was drawn from the original specimen of Mr. Lea.

Haldeman quotes *Pl. regularis* as a synonym, and Adams *Pl. lentus* and *corpulentus*.

Planorbis regularis, Lea.—Shell subglobose, above nearly flat, beneath narrow, umbilicate, pellucid, pale yellow, obsoletely striate; whirls three, above carinate; lip acute, margined, within thickened; aperture ovate.

Fig. 196.

Planorbis regularis.

Hab. United States. My cabinet, and cabinet of P. H. Nicklin. Diam. .30, length .20 of an inch.

I have unfortunately mislaid the label which accompanied the shells from which the above descriptions were made. My impression is that they came from one of the Western States. All the specimens before me are very much alike in size and form—being exceedingly regular. The striæ are more perceptible around the umbilicus and on the spire. On the side they are so much obliterated as to permit the whirl to present a shining appearance. The carina is very sharp and well defined. It has very much the appearance of a young *trivolvis*, Say, and may possibly be only a variety of that species. (*Lea.*)

Bulla fluviatilis, Say.—Shell suboval, pellucid, pale yellowish-white finely wrinkled; volutions three; body whirl large, with a prominently carinated shoulder bounding the spire; spire perfectly flat or slightly concave, giving to the shell a perfectly truncated appearance in that part; aperture longer than the columella, oblong-ovate, extending beyond the tip of the spire; umbilicus profound, edged by a slight carina. Length of the aperture one-fifth of an inch; greatest breadth somewhat less.

Inhabits the river Delaware. This species seems to be rather rare; it was discovered by Mr. Aaron Stone, deeply imbedded in the mud. Mr. William Hyde, of this city, has since found specimens of it amongst some dead shells of other genera assembled in a small inlet of the river. (*Say.*)

Physa planorbula, DeKay.—Shell small, thin and fragile, sinistral, cylindrical above, tapering beneath, abruptly truncated on the summit; apex very slightly elevated above the truncation. Whirls four, the surface smooth, with minute revolving lines crossed by others equally minute. Body whirl with an acute shoulder, the edge being slightly turned over. Aperture as long as the shell, narrow above, dilated beneath, and broadly rounded. Outer lip acute, thin and reflected over the enlarged umbilicus. Color light amber. Length 0.2 inch.

Fig. 197.

Physa planorbula.

This singular shell was found by Mr. G. B. Clendining at the Cohoes Falls, adhering to stones. I have adopted the name proposed by its discoverer. It was alive, and was destitute of an opercule. It is supposed by some conchologists to be a young *Planorbis*, but I cannot learn that it has been found in the intermediate stages. It is placed provisionally here; but if a perfect animal, must constitute a new genus. I am inclined to suspect that it is the animal described by Say as *Bulla fluviatilis*. (*DeKay.*)

Planorbis megastoma, DeKay.—Shell large, coarse and solid. Whirls nearly five, rounded, with coarse transverse waving wrinkles, becoming larger towards the mouth. A large prominence on the body whirl nearly opposite to the aperture, producing an obtuse angle. Spire depressed, with the suture distinct; beneath, the volutions are exhibited nearly to the apex. Mouth dilated, but somewhat contracted at the margin, 0.3 inch wide and 0.4 high; its lower portion rounded, arising from the lower part of the penultimate whirl; line of the upper margin more nearly straight. In the young, the aperture is not so much dilated, and is obscurely trigonal, with the lower margin beneath the plane of the transverse diameter of the shell. Color olivaceous, tinged with yellowish within the aperture. In the young, black, with the interior of the aperture dull reddish. Diameter 0.8, height 0.3 inch.

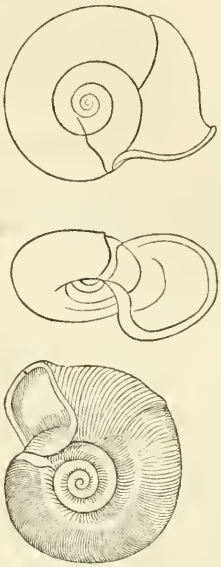
Fig. 198.

Planorbis megastoma.

This *Planorbis* was found near Lake Ontario, and appears to be different from any species yet described. In its aperture it resembles the small *P. dilatatus* of Gould, but is otherwise very distinct. (*DeKay.*)

Planorbis macrostomus.—Shell in many points closely resembling *Pl. lentus*, Say, of which perhaps it may only be a variety. It is much larger, higher, and has deeper costæ; its lines of growth are very prominently marked; the upper angle of the whirls, as shown in the mouth, is more prominent. Lip widely expanded, and reflected, covered with a white enamel. In this latter character it differs from all the American species of *Planorbis*. It is a species nearly allied to *Planorbis lentus* and *P. trivolvis;* but apparently distinct from both. (*Whiteaves.*)

Fig. 199.



Planorbis macrostomus.

I am inclined to believe *Pl. proboscideus* to be identical with *Pl. trivolvis.* The figure of Potiez & Michaud, copied below, represents a more flattened shell than usually found in *trivolvis*, and the whirls are more numerous. The original description also is given below.

Planorbis proboscideus (Mke., teste Ziegler).—This shell has a slight resemblance in form to a young *Pl. corneus*, but it has strong longitudinal striæ; the six whirls are carinated towards the two umbilici, and rounded at the periphery; the upper umbilicus is deep, as well as the lower, which is also large; the aperture is subtrigonal and irregular, which is caused by a depression below. Diam. 20 mill., height 10 mill.

North America in Ohio. (*Potiez & Michaud.*)

Fig. 200.

Planorbis proboscideus.

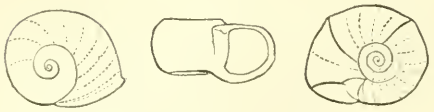
A copy of Prof. Haldeman's description and figure of *Pl. trivolvis*, var. *fallax*, now follow.

Planorbis trivolvis, var. *fallax.*—*Animal* dark brown, minutely dotted with ochre-yellow, upon the parts which are usually exposed; tentacles very long, colored like the body, except that the tint is somewhat lighter near the base; foot posterior to the neck, about equal in length to the head in front of the tentacles.

Shell thin in texture, translucent, and transversely striate; two and a half turns are visible above, the remaining ones disappearing in the narrow umbilic; lower side carinated, having a wide, shallow cup, as

in figure 9, when the left posterior angle of the aperture advances along the carina; but the symmetry of the cup disappears, when the inner portion of the last whirl revolves to the right of the carina, as in figure 3; in this case, the right margin of the aperture is nearly level with this side of the shell, but it is frequently thrown below, or to the left of it, when it bears some resemblance to figure 5: aperture slightly compressed anteriorly, the left margin extending beyond the plane of the shell. Color light brown, sometimes greenish.

Fig. 201.



Planorbis trivolvis, var. *fallax*.

Massachusetts, Lake Erie, Indiana?

Monstrosity: Posterior extremity of the foot divided.

In color and consistency, the ova resemble those of *P. bicarinatus*. Dr. Gould has expressed an opinion, that if this be not *P. lentus*, it must be an uncharacterized species. He remarks that it is "a darker shell than *P. trivolvis*, and is distinguished from it by its left side and its aperture. The cup of the left side is less smooth and regular, and is not bounded by the sharp, elevated line; when this shell is laid upon its right or upper side, the lip of that side will scarcely touch the plane on which it lies; while, in *P. trivolvis*, the shell would be lifted by the lip; the aperture has not the sharp angle of the left side produced by the termination of the carina, but in the young stages it is difficult to distinguish the two."

Professor Adams remarks that "*P. lentus*, *P. corpulentus*, and *P. trivolvis*, of Say, are undoubtedly varieties of one species;" but he sent me large specimens of *P. trivolvis* (pl. 2, fig. 6) as *P. corpulentus*: and believed the shell now under consideration to belong to *P. lentus*. I have figured it upon the same plate with the latter, to afford a ready comparison between them; and have thought best to describe it at large, under a distinct heading. I have seen it living in the vicinity of Boston, but have examined so small a number of individuals, that I do not feel myself competent to make a final decision between two authors whose location gives them facilities which I do not enjoy. (*Haldeman.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8115	14	Pacific Coast.	.....	.....
3253	5	San Diego, Cal.	P. R. R.	.....
8124	9	Mohawk, N. Y.	Dr. J. Lewis.	Local var.
8125	15	Yellowstone River.	.....	.....
8126	9	St. Clair River.	.....	Strongly ribbed.
8127	17	Newport, R. I.	W. G. Binney.	.....
8128	15	Utah.	Capt. J. H. Simpson.	.....
8129	3	Madison, Wis.	Prof. S. F. Baird.	.....
8130	3	Farwell's Mills, 3 mile Creek, Oswego, N. Y.	Dr. J. Lewis?	.....
8131	5	Toledo, O.	T. A. Bossard.	.....
8132	5	Ruby Valley.	Capt. J. H. Simpson.	.....
8133	6	Grand Coteau, La.	.....	.....
8144	16	.....	.....	Young.
8145	3	20 m. w. of Choctaw, Ar.	Lt. A. W. Whipple.	.....
8146	6	Cape Elizabeth, Me.	Dr. J. Lewis.	Local var.?
8147	7	Port Huron, Mich.	Prof. S. F. Baird.	.....
8148	15	Lake Winnipeg. [town.	R. Kennicott.	.....
8149	3	Little R., near Shawnee-	.....	.....
8150	15	Mohawk, N. Y.	Dr. J. Lewis.	.....
8151	1	Between Pike Lake and Fort Union.	Gov. J. J. Stevens.	.....
8152	2	Rud's Lake, Mich.	.....	.....
8153	6	Goose Island, Mich.	.... .	.....
8154	4	Michigan.	W. G. Binney	.....
8155	2	Illinois. [Min.	.....	.....
8156	5	Lake Como, St. Pauls,	S. B.	.....
8157	4	Prairie Lakes, n. Red R.	R. Kennicott.	.....
8158	16	Southern Illinois.	"	.....
8159	5	Grindstone Creek.	.....	.....
8160	12	Ruby Valley?	Capt. J. H. Simpson.	..... [Griffith.
8161	2	Delaware River.	W. G. Binney.	Labelled by Dr. R. E.
8162	8	Apple Creek, lat. 47°.	.....	.....
8163	7	New York.	Dr. J. Lewis.	.....
8164	1	Big Sioux.	.....	.....
8165	25	Columbus, Ohio.	Dr. J. Lewis.	.....
3523	2	30 m. w. of Ft. Kearney.	.....	.....
8166	2	Centre County, Pa.	.....	.....
8167	9	.....	.....	Young.
8168	4	Milwaukee Wis.	I. A. Lapham.	"
8169	9	Marietta, O.	W. Holden.	.....
8170	4	Milwaukee, Wis.	I. A. Lapham.	.....
8171	3	Texas.	.....	.....
8200	5	Milwaukee, Wis.	I. A. Lapham.	.....
8448	12	Chilencynck Depot, Puget Sound.	A. Campbell.	Animal in alcohol.
8475	3	Madison, Wis.	Prof. Baird.	Cabinet series.
4399	6	Pacific Coast.	.....	"
4426	8	San Francisco.	.....	"
8731	5	"	Rowell.	.....
8952	1	Fort Simpson, Br. Am.	R. Kennicott.	.....
8173	8	Fort Union.	.....	Var. *fallax*.
8505	2	.....	W. G. Binney.	" Cab. ser.
8971	..	Fort Resolution.	Kennicott.	.....
9062	100+	Grand Rapids, Mich.	Dr. J. Lewis.	.....
9064	50+	Hudson's Bay.	Drexler.	.....
9069	20+	Fort Simpson.	Kennicott.	.....
9110	20+	Mohawk, N. Y.	Dr. Lewis.	.....
9112	50+	"	"	.....
9115	3	Fort Vancouver.	Cooper.	.....
9120	1	California.	"	.....
9272	10	Isle la Crosse.	Kennicott.	.....
9275	5	Great Slave Lake.	"	.....
9257	50+	Massachusetts.	Stimpson.	.....
9259	6	Wright's Lake, Cal.	Newberry.	.....

Planorbis truncatus, MILES.—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 whirls, the suture being marked by a minute 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; whirls on 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 whirl, 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 in the raised line separating the whirls on the outside; lip thin, slightly thickened by a blnish 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. Measnrements, 6—35.

Fig. 202.

Planorbis truncatus.

Hab. Saginaw Bay.

In a few specimens the growth of the whirls has not been in the same plane, leaving a slightly projecting turreted spire on the left side. (*Miles.*)

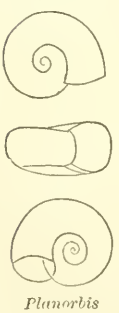
Planorbis truncatus, Miles in Winchel's Geol. Surv. Michigan, 1861, p. 238.

Fig. 202 is drawn from No. 9010 of the collection, furnished by Prof. Miles, whose description is given above.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9010	1	Michigan.	Prof. Miles.	Fig. 202. Type.

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

Fig. 203.



Planorbis fragilis.

Shell very ventricose, very thin and fragile, delicately striated, pale horn or amber colored; above very deeply umbilicated, with the apex hardly visible; below, slightly concave. Whirls four, rounded, strongly involute and rapidly increasing, the last with microscopic striæ; aperture oblique, wide, kidney-shaped; on the parietal wall is a delicate callus connecting the termini of the peritreme. Greatest diam. .6, height at aperture $3\frac{1}{3}$ lines.

Hab. Near Mexico, with *P. tenuis*, which is, however, a rarer species: David & Herr Geb. M. R. Dr. N. Meyer. (*Küster.*)

Planorbis fragilis, Dunker in Ch. ed. 2, p. 46, pl. viii, f. 41–43.

I have given above a copy of the description and figure of this species.

Planorbis lautus, H. Adams.—Shell subovate, thin, the height equalling the width, yellowish-white, deeply and narrowly umbilicated above, flat below; whirls three, rapidly increasing, rounded, angulated and contracted above, carinated below, decussated by fine striæ; aperture slightly oblique, subovate, extending above the penultimate whirl, peritreme continuous. Diam. 2 lin.

Hab. New Orleans. (*H. Adams.*)

Planorbis (*Helisoma*) *lautus*, H. Adams, Proc. Zool. Soc. London, 1861, p. 145.

I have not seen this species, of which the original description is given above.

Planorbis bicarinatus, Say.—Shell sinistral, pale yellow or brownish, subcarinate above, and beneath translucent. Spire retus-umbilicate, forming a cavity as deep as that of the base. Aperture large, embracing a considerable portion of the body whirl, and much vaulted above. Within red brown, with two white lines corresponding with the carina. Whirls three, wrinkled and with minute revolving lines. Length one-fourth of an inch, breadth nearly half an inch.

Fig. 204.

Planorbis bicarinatus.

Fig. 205.

Planorbis bicarinatus.

Inhabitant aquatic, ferruginous, with numerous yellowish dots; tentacula dotted and flexuous. Pl. 1, fig. 4. Resembles the preceding species in its outline, but differs from that shell in the remarkable appearance of its spire; it is also destitute of those fine parallel raised lines, and is furnished with minute striæ, never visible in *P. trivolvis;* the superior part of the lip is more vaulted, and the carina more visible. (*Say.*)

Planorbis bicarinatus, Say, Nich. Ency. pl. i, f. 4 (1817, 1818, 1819); Am. Conch. 6, pl. liv, f. 3 (1834): Binney's ed. 44, pl. liv, f. 3; pl. lxix, f. 4.—Mrs. Gray, Fig. Moll. An. pl. cccx, f. 1.—Haldeman, Mon. vii, p. 6, pl. i, f. 1–6 (1844).—Adams, Shells of Vt. 155 (1842).—DeKay, N. Y. Moll. 60, pl. iv, f. 63 (1843).—Gould, Inv. of Mass. 203, f. 134 (1841).—Chemn. ed. 2, p. 56, pl. lx, f. 11–13.—Potiez et Michaud, Gal. des Moll. I, 207, pl. xxi, f. 1–3.—Anon. Can. Nat. II, 204, fig. (1857).

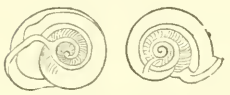
Helix angulata, RACKETT, Lin. Tr. XIII, p. 42, pl. v, f. 1 (1822).—WOOD, Cat. Suppl. pl. vii, f. 12: HANLEY's ed. p. 226.
Helix bicarinatus, EATON, Zool. Text-Book, 194 (1826).
Planorbis engonatus, CONRAD, N. Fresh Sh. Suppl. p. 8, pl. ix, f. 8 (1834).—LISTER, 139–44?

The species ranges from the British Possessions to Kansas and Georgia.

It must not be confounded with *Planorbis bicarinatus* of Lamarck, An. sans Vert. vol. 7, Aug. 1822.

Fig. 204 is a fac-simile of that of Say, and Figs. 206 and 207 of those of Rackett and Conrad. Haldeman, who saw the original specimen of the latter declares it to be a monstrosity of *Plan. bicarinatus*. The original descriptions are also given below.

Fig. 206.



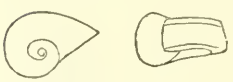
Helix angulata.

Helix angulata, RACKETT (*l. c.*).—Shell imperforate, concave on both sides; first whirl angulated on both sides.

Hab. Near Lake Huron. Diam. $\frac{1}{2}$ inch.

Transversely striate, pale yellow; three to four contiguous whirls; aperture large, rimmed. (*Rackett.*)

Fig. 207.



Planorbis engonatus.

Planorbis engonatus, CONRAD.—Shell yellowish, triangulated above, spire not profoundly impressed, side of the body whirl flattened, and both margins carinated; aperture longitudinally subovate, slightly campanulate.

This species was found at Albany, N. Y., by Mr. Alva Mason. It differs from all other species of the United States in the flattened form of its lateral or outer margin. (*Conrad.*)

Planorbis bicarinatus of Sowerby's Genera of Shells appears rather to be identical with *Pl. campanulatus*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8212	20	Cherry Creek.	.....	.....
8213	15	Mohawk River, N. Y.	Dr. J. Lewis.	.....
8214	11	Northern Georgia.	A. Gerhardt.	.....
8215	5	Milwaukee, Wis.	I. A. Lapham.	.....
8216	11	Big Sioux.	.....	.....
8217	4	Yellowstone.	.....	.....
8218	10	Little Lakes, N. Y.	Dr. J. Lewis.	.....
8219	3	Herkimer County, N. Y.	"	.....
8220	5	Big Cr., Centre Co., Pa.	.....	.....
8221	6	New York?	Dr. J. Lewis.	.....
8222	2	Illinois.	.....	.....
8493	3	New York.	Dr. J. Lewis.	Cabinet series.
9111	50+	Mohawk, N. Y.	"	.....
9113	50+	"	"	.....
9262	15	Virginia.	Dr. English.	.....

Planorbis antrosus, Conrad.—Shell dextral, not depressed; whirls three; spire profoundly indented or concave, with the summit of the body whirl angular; inner volutions angulated, umbilicus profound, with the margin and inner volutions angulated; body whirl abruptly dilated near the aperture; aperture longitudinally subovate, dilated.

Randon's Creek, near Claiborne, Alabama, adhering to limestone rocks. (*Conrad.*)

Planorbis antrosus, Conrad, Am. Journ. Sc. [1], XXV, No. 2, p. 343 (1834). —DeKay, N. Y. Moll. 66 (1843).—Müller, Syn. Test. 1834 prom. p. 34 (1836).

I have seen no authentic specimen of this shell.

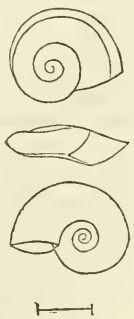
Subgenus **MENETUS**, H. & A. Ad.

Shell depressed; whirls rapidly increasing, periphery angulated.

Moquin-Tandon uses *Hippeutis* of Agassiz instead of *Menetus* as a name for this section. I do not have access to the description of *Hippeutis*, and therefore follow H. & A. Adams in using *Menetus*.

Planorbis opercularis, Gould.—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; whirls above four, slightly convex; suture well defined, impressed; aperture transversely sub-rhombic, lip above slightly declining, at periphery acute-angled, beneath arched, lips embracing three-fourths of that part of the whirl which is beneath the carina. Length one-fourth, diam. one-sixteenth inch.

Fig. 208.



Planorbis opercularis.

Sacramento River, 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*. (*Gould.*)

Planorbis opercularis, Gould, Proc. Bost. Soc. Nat. Hist. II, 212 (1847); U. S. Ex. Ex. Moll. 113, f. 132, 132 *a*, 132 *b* (1852); Otia, 42.

Planorbis planulatus, COOPER, Report on the Nat. Hist., &c., of Washington Terr., &c., p. 378 (1859); P. R. R. Rep. XII, 378.

Dr. Gould's description and figures are given above. There can be no doubt of the identity of Cooper's species with it. The Fig. 209 is drawn from a shell furnished by Judge Cooper, who also has enabled me to examine all the shells collected by Dr. Cooper.

Fig. 209.

Planorbis planulatus.

Planorbis planulatus, COOPER.—A small carinated species, flat above, convex below, having much the appearance of a *Valvata*, found only in Lakes on Whidby's Island at the entrance of Puget Sound. (*Cooper.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
4280	4	San Francisco.	Com. Wilkes.	Cabinet series.
8718	4	"	Rowell.	[(*planulatus*).
9118	3	Whidby's Island.	Judge Cooper.	Type. Fig. 209

Planorbis exacutus, SAY.—Dextral, depressed, with an acute edge. Inhabits Lake Champlain. Cabinet of the Academy.

Shell depressed; whirls four, striated across, wider than long, not elevated above the suture, but a little flattened, sides obliquely descending to an acute lateral edge, below the middle; spire not impressed; suture not profoundly indented; beneath, body whirl flattened, on the inner edge rounded; umbilicus regular, exhibiting all the volutions to the apex; aperture transversely sub-triangular; labrum angulated in the middle, arcuated near its inferior tip, the superior termination just including the acute edge of the penultimate whirl. Greatest breadth rather less than $\frac{1}{4}$ of an inch.

Fig. 210.

Planorbis exacutus.

This species was found in Lake Champlain by Mr. Augustus Jessup, who deposited it in the collection of the Academy. Only two specimens occurred. It may be readily distinguished from *P. parvus*, by its more convex form above, the spire not being impressed, and by its very acute lateral edge. It appears to be pretty closely allied to *Planorbis nitidus* of Europe, but it is larger, the umbilicus much more dilated, and the aperture does not embrace the penultimate whirl so profoundly. (*Say.*)

Planorbis exacutus, SAY, Jour. Acad. Nat. Sc. II, 165 (1821): BINNEY'S ed. 64.—HALDEMAN, Mon. 21, pl. iv, f. 1–3 (1844).—GOULD, Inv. of Mass. 208, f. 137 (1841).—ADAMS, Shells of Vt. 155 (1842).—DEKAY, N. Y. Moll. 63, pl. lv, f. 62 *a*, *b* (1843).—ANON. Can. Nat. II, 207, fig. (1857).

Planorbis lens, LEA, Tr. Am. Phil. Soc. VI, 68, pl. xxiii, f. 83; Obs. II, 68 (1839).

Planorbis brogniartiana, Lea, Tr. Am. Phil. Soc. IX, 24; Obs. IV, 24 (1844); Pr. II, 242 (1842).

Planorbis lenticularis, Lea, Tr. Am. Phil. Soc. IX, 6; Obs. IV, 6 (1844).

Planorbis buchanensis, Lea, Tr. Am. Phil. Soc. IX, 6 (1844); Pr. II, 32 (1841); Obs. IV, 6.

Paludina hyalina, Lea, Tr. Am. Phil. Soc. VI, 17, pl. xxiii, f. 81; Obs. II, 17 (1839).

The species has been quoted from New England to Kansas and the District of Columbia.

The single individual from which Mr. Lea drew his description of *Paludina hyalina* has been lost. I have not seen it. The following copy of the original description and figure will at once convince the reader of its being a distorted specimen of *Planorbis exacutus*.

Paludina hyalina, Lea.—Shell obtusely conical, carinate, diaphanous, flattened below; whirls four; sutures very much impressed; aperture widely rounded. Diam. .2, length .2 inch nearly.

Near Poland, Ohio: Dr. Kirtland. Cabinet of Mr. Hyde.

Fig. 211.

Paludina hyalina.

Dr. Kirtland sent the only specimen of this shell I have seen to Mr. Hyde, under the impression that it was a deformed specimen of *Planorbis*. Mr. Hyde communicated it to me as a new species, of which there cannot, I think, be a doubt. It is very remarkable for the flatness of the inferior portion of the last whirl, and for the carina on the periphery which this causes. It is perhaps thinner and more transparent than any species yet described. (*Lea.*)

Planorbis buchanensis, Lea, is evidently synonymous with *P. exacutus*. The original description and figures from Mr. Lea's type now follow:—

Planorbis buchanensis, Lea.—Shell sub-lenticular, above sub-convex, carinate at the periphery, beneath narrow umbilicate, horn-color or brownish, smooth; whirls three; lip sharp; aperture rounded.

Fig. 212.

Planorbis buchanensis.

Hab. Near Cincinnati, Ohio: R. Buchanan. My cabinet, and cabinets of T. G. Lea and R. Buchanan. Diam. .12, length .08 of an inch.

Several specimens of this species were sent to me several years since by my brother T. G. Lea, who informed me that they were first observed by Mr. Buchanan, after whom I name it. This species is very nearly allied to *P. lens*, Nobis, but it may at once be distinguished by its round aperture, which is somewhat spread out. The aperture of the *lens* (now *lenticularis*), is *triangular*, and the size of the shell rather larger. (*Lea.*)

Planorbis lens is referred doubtfully to *exacutus* by DeKay. Gould refers it to *P dilatatus*. I have no hesitation in placing it in the synonymy of *Pl. exacutus*. No. 8508 of the collection was labelled *P. lens* by Mr. Lea. A copy of his description and figure here follow. The names *P. lenticularis* and *P. brogniartiana* were suggested by Mr. Lea in place of the pre-occupied name first published by him.

Planorbis lens, LEA.—Shell small, lenticular, widely umbilicate, carinate on the periphery, pellucid, horn-colored; whirls three; aperture large.

Fig. 213.

Planorbis lens.

Hab. Near Cincinnati, Ohio: R. Buchanan. My cabinet, and cabinets of R. Buchanan and T. G. Lea. Diam. 3-20ths, length 1-20th of an inch.

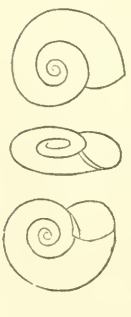
This is the smallest of the *Planorbes* which has come under my notice, and may at once be distinguished by its lenticular form. The specimens in my possession I owe to my brother T. G. Lea. They were first pointed out to him by Mr. Buchanan. (*Lea.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8203	2	Ohio.	S. M. Luther.	.....
8209	12	Marietta, Ohio.	W. Holden.	.....
8210	2	Milwaukee, Wis.	I. A. Lapham.	.....
8211	10	Ann Arbor, Mich.	W. G. Binney.	.....
8494	2	.....	"	Cabinet series. [Lea.
8508	3	Yellowstone River.	Dr. F. V. Hayden.	Marked *Pl. lens* by I.
9252	1	.....	.....	(*lens*, teste Lea.)

SUBGENUS **GYRAULUS**, AGASSIZ.

Shell orbicular above, flat beneath; whirls few, rapidly increasing.

Fig. 214.



Planorbis vermicularis.

H. & A. Adams use *Nautilina*, Stein, as a name for this section, but Moquin-Tandon uses Agassiz' name. I am unable to decide which should have preference.

Planorbis vermicularis, GOULD.—Shell small, dome-shaped, minutely striated by growth, white (probably bleached by the liquor from which it was taken); whirls four, breadth and height about equal, the last one deflected near the aperture, rounded at periphery, tip depressed, suture very deep, the whirls sloping towards it; base cup-shaped, exhibiting all the whirls. Aperture exhibiting a very oblique section of a cylinder; lip

embracing about one-half the height of the last whirl and joined by callus. Diam. one-fifth, height one-fifteenth inch.

Interior of Oregon: Drayton.

It is about the size of *Plan. deflectus*, Say, but is less depressed, the whirls more cylindrical, not carinated at periphery. (*Gould.*)

Planorbis vermicularis, Gould, Proc. Bost. Soc. Nat. Hist. II, 212 (1847); U. S. Ex. Ex. Moll. p. 112, f. 131, 131 *a*, 131 *b* (1852); Otia, 42.

I have seen no specimens of this species. The original descriptions and figures are given above.

Planorbis deflectus, Say. — Shell dextral, depressed; whirls nearly five, minutely and regularly wrinkled across, wider than long with a much depressed rotundity above, descending to an acute lateral edge below the middle; spire not impressed; suture indented, but not profoundly; beneath a little concave in the middle, exhibiting one-half of each volution to the apex; whirls flattened, slightly rounded; aperture declining very much, suboval, the superior portion of the labrum considerably surpassing the inferior portion, and taking its origin a little above the carina; inferior portion of the labrum terminating on the middle of the inferior surface of the penultimate whirl. Greatest breadth two-fifths of an inch.

Fig. 215.

Planorbis deflectus.

This shell was presented to me by Dr. Bigsby, who collected many specimens in the waters of the Northwest Territory. It resembles the *exacutus*, Nob., but the aperture does not embrace so large a portion of the preceding volution, and the volutions on the inferior portions of the shell are consequently more obvious and the umbilicus is but slightly indented; the upper portion of the labrum does not extend so far beyond the lower portion, the aperture declines much more, and the carina is less acute. It has also an affinity for the *carinatus* of Europe, but in addition to other differences, the aperture of that species declines but little, if at all, and the carina is an elevated revolving line. The aperture embraces the penultimate volution about as much as in the *rotundatus* of Europe, to which our shell is also allied, but differs in its declining aperture, and the less degree of rotundity of its whirls on their upper surface. (*Say.*)

Planorbis deflectus, Say, Long's Ex. II, 261, pl. xv, f. 8 (1824): Binney's ed. p. 128, pl. lxxiv, f. 8.—Haldeman, Mon. 25, pl. iv, f. 4–7 (1844).—Gould, Invert. 207, f. 136 (1841).—Adams, Shells of Vt. 156 (1842).—DeKay, N. Y. Moll. 65 (1843).—Anon. Can. Nat. II, 206, fig. (1857).

Planorbis virens, Adams, Am. Journ. Sc. [1], XXXIX, p. 274 (1840); Bost. Journ. III, 326, pl. iii, f. 15 (1840).—DeKay, N. Y. Moll, 66 (1843).

Planorbis obliquus, DeKay, N. Y. Moll. 62, pl. iv, f. 57 *a*, *b* (1843).
Nautilina deflecta, Chenu, Man. de Conch. II, 482, f. 3566.

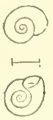
This species is said to range from great Slave Lake to the District of Columbia, and from New England to Nebraska.

Mr. Say's type is still preserved in the Philadelphia Academy.

I am inclined to place *P. obliquus* in the synonymy of *P. deflectus*. *Pl. virens* is so considered by both Gould and Haldeman. Copies of the original descriptions and figures here follow:—

Planorbis virens.—Shell small, greenish horn-color, with thick, obvious striæ of growth, and very slight revolving lines, with a green rough epidermis; whirls four; suture impressed; spire not rising above the last whirl, but scarcely falling below it; last whirl much larger than the spire, flattened above, then abruptly curving downwards (in the young shell, at the upper third of the last whirl, is a carina, which is gradually modified into the abrupt curvature, in the progress of growth), subcarinate below, as are also the preceding whirls; aperture nearly orbicular, interrupted by the last whirl in about one-fifth of its circumference, advancing above; umbilicus as broad as the last whirl, rather deep, exhibiting all the volutions. Height (of the last whirl) .09 inch, greatest breadth .23 inch, least breadth .18 inch. Cabinets of the Bost. Soc. Nat. Hist., of Middlebury College, of Mr. Shiverick, and my own.

Fig. 216.



Planorbis virens.

Habitat. New Bedford.

For this species I am indebted to Mr. Shiverick. It differs from *P. parvus*, Say, in being much less broadly and more deeply umbilicate beneath; it is also higher. *P. parvus*, also, instead of being subcarinate on the lower side of the whirls is much flattened. *P. concavus*, Anthony MSS., resembles this species, but is more regularly convex above and concave beneath. (*Adams.*)

Planorbis obliquus, DeKay.—Shell depressed, discoidal. Volutions four; the surface shining, with regular minute incremental lines; the body whirl obsoletely subangular below. Spire nearly as much depressed as the umbilicus, which latter is large and exhibits all the volutions to the apex; suture distinct; body whirl not distinctly deflected from the plane of the other volutions. Mouth unarmed, very oblique. Color dull olive. Diameter 0.3, height 0.1.

Fig. 217.

Planorbis obliquus.

The specimens of this species were obtained from the Mohawk and from Newcomb's Pond, in Pittstown, and presented by Dr. B. W. Budd, of this city. Some eminent conchologists suppose it to be a variety of the *deflectus* of Say; but from this it differs by the obliquity of the mouth when turned downwards, and has no acute lateral edge as in that species. The *concavus* of Anthony, of which I have seen

specimens, but no description, may possibly be the young of this, but at all events is a closely allied species. (*DeKay.*)

Planorbis deformis, Lam., figured in Delessert's Recueil, very much resembles this species in the characteristic deflection of the last whirl at the aperture.

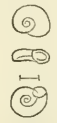
Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8190	19	Milwaukee, Wis.	I. A. Lapham.	.....
8191	14	Loup Fork.	.....	.....
8192	1	Lake of the Woods.	R. Kennicott.	.....
8193	12	Washington, D. C.	.....	.....
8194	3	Ann Arbor, Mich.	.....	.....
8501	5	Wisconsin.	I. A. Lapham.	Cabinet series.
9273	8	Great Slave Lake.	R. Kennicott.	.....

Planorbis dilatatus, Gould.—Shell small, circumference carinated, flat above, convex below, and with a small, deep umbilicus; whirls three; aperture large, expanded.

State Coll. No. 75, Soc. Cab. No. 2399.

Shell small, of a yellowish-green color, minutely wrinkled by the lines of growth; spire flat, composed of not more than three whirls, separated by a well-defined suture; the outer whirl has a sharp margin on a level with the spire, diminishing near, but still modifying, the aperture; below this line, the whirl is very convexly rounded so as to encircle a small, deep, abruptly formed umbilicus. This whirl rapidly enlarges, and terminates in a very large, not very oblique aperture, with the lip expanded so as to make it trumpet-shaped. Largest diameter three-twentieths inch, breadth one-twentieth inch.

Fig. 218.



Planorbis dilatatus.

This curious little shell was found several years since on the Island of Nantucket, clinging to some damp moss, and was communicated by Mr. J. M. Earle, of Worcester. Specimens of it have also been sent to me by Professor Foreman, of Baltimore. But its characters were not fully ascertained from these few specimens. In July, 1840, Mr. T. J. Whittemore found it in great numbers at Hingham, in a small pool, southeast of the Old Colony House.

It has a miniature resemblance to *P. bicarinatus*, as to its two sides, but it has only a single carina, which encircles the shell, instead of one on each side. Its large, expanded aperture, and small, deeply sunken umbilicus, readily distinguish it from any of the small species hitherto known. The surface is rather rough, and perhaps a little hispid when viewed under the microscope. The *P. lens* of Lea (Amer. Philos. Trans., New Series, VI, 68, pl. xxiii, f. 83), which he received from near Cincinnati, is probably the same as this shell. His name, however, is pre-occupied by a fossil species. (*Gould.*)

Planorbis dilatatus, Gould, Invert. of Mass. 210, f. 140 (1841); Otia, 182. —Haldeman, Mon. 23, pl. iv, f. 16–18 (1844).—DeKay, N. Y. Moll. 66 (1843).—Anonymous, Can. Nat. II, 209, fig. (1857).

Planorbis dilatus, Haldeman, Mon. p. 25 (Jan. 1844).

Fig. 218 is a fac-simile of Gould's figures; his description is copied above.

Dr. Pfeiffer (Arch. f. Nat. 1841, p. 225) has described an European species under the same name, and in the same year (1841) as Dr. Gould's species was published. The latter appeared during the session of the Legislature in the spring. Prof. Haldeman (*l. c.*) suggests the name "*dilatus*," should it be necessary to give a new name to our shell.

Gould (*l. c.*) refers to this species *Pl. lens*, Lea.

It has been noticed from New England to Maryland.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8510	1	Massachusetts.	W. G. Binney.	Cabinet series.

Planorbis albus, Müll.—Shell light yellowish-brown, concave on both sides, most so on the left; whirls three; surface beset with revolving lines of rigid hairs; aperture large, very oblique.

Fig. 219.

Planorbis albus.

Fig. 220.

Planorbis albus.

Fig. 221.

Planorbis albus.

State Coll. No. 82, Soc. Cab. No. 1278.

Shell small, somewhat transparent, of a brownish-yellow color; both sides concave, the left rather more than the right, but the concavity is there more limited by the presence of a sub-angular ridge on the outer whirl; whirls three, the outer one rapidly increasing; surface exhibiting traces of revolving lines when denuded, but usually covered with a dark pigment or epidermis, bristling with rigid hairs which are arranged in close revolving lines; lines of growth very faint; aperture sub-oval, oblique, its diameter from side to side shorter than in the opposite direction; its plane very oblique. Long diameter one-fifth inch, short diameter one-fifteenth inch. Animal has the head slate-colored above, with a darker line along each tentaculum, not originating from the eyes; foot chestnut colored.

This shell was first found by Professor C. B. Adams, in Mansfield, from whom I received it. I have since found it in several localities in Dorchester, Dedham, and Cambridge, adhering to sticks in stagnant water; and it may doubtless be found in all similar localities.

This *Planorbis*, though in many respects it resembles in shape *P. deflec-*

tus, is readily distinguished from all other American species by the revolving hairy lines. It is the analogue of the European *P. albus*, from which it is difficult to designate any very characteristic difference. It is, however, a thinner shell, the last whirl increasing more rapidly; and it maintains its yellowish-horn-color, whereas *P. albus* assumes a spermaceti or still whiter appearance. The lines, too, disappear more entirely when the epidermis is gone. (*Gould.—P. hirsutus.*)

Planorbis albus, Müller, Haldeman, Mon. 29, pl. iv, f. 8–10 (1844).

Planorbis hirsutus, Gould, Am. Journ. Sc. [1], XXXVIII, 196 (1840); Invert. of Mass. 206, f. 135 (1841); Otia, 180.—Adams, Shells of Vt. 156 (1842).—DeKay, N. Y. Moll. 64 (1843).—Anonymous, Can. Nat. II, 206, fig. (1857).

Said to have been found from New England to the Saskatchewan, and in the District of Columbia.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8511	2	.....	W. G. Binney.	Cabinet series.

Planorbis parvus, Say.—Shell horn-color or blackish; whirls four, crossed by minute wrinkles; concave above and beneath, and equally exhibiting the volutions, body generally subcarinate on the margin; lip rounded, and not vaulted above nor thickened; mouth within bluish-white. Breadth one-fifth of an inch.

Fig. 222.

Planorbis parvus.

Fig. 223.

Planorbis parvus.

Animal aquatic, brown, tentacula long, filiform, whitish, with a darker central line; tail rounded. Probably the same species with that figured by Lister, tab. 139, fig. 45; it is very numerous in the Delaware, in company with the two preceding shells. (*Say.*)

Fig. 224.

Planorbis parvus.

Planorbis parvus, Say, Nich. Ency. pl. i, f. 5 (1817, 1818, 1819): Binney's ed. p. 45, pl. lxix, f. 5.—Haldeman, Mon. 27, pl. iv, f. 19–23 (1844).—Gould, Invert. 209, f. 139 (1841).—Adams, Shells of Vt. 156 (1842).—DeKay, N. Y. Moll. 63, pl. iv, f. 58 (1843).—Anon. Can. Nat. II, 208, fig. (1857).

Planorbis concavus, Anthony, Cat. of Shells of Cincinnati, no desc.

Planorbis elevatus, Adams, Bost. Journ. Nat. Hist. III, 327, pl. iii, f. 16 (1840).—Gould, Inv. of Mass. 207 (1841).—DeKay, N. Y. Moll. 65.

Helix parvus, Eaton, Zool. Text-Book, 195 (1826).

Said to inhabit the whole of eastern North America.

Mr. Say's type is still preserved in the Philadelphia Academy's collection.

Haldeman considers *Pl. elevatus* a synonym of this species. No. 8509 of the collection was labelled by J. G. Anthony *Pl. concavus*, a name occurring in catalogues, but not described. I have no doubt of its identity with this species. No description was ever published, as Mr. Anthony informs me, owing to the doubts of its being distinct. The original description and figure of *Pl. elevatus* are given below.

Planorbis elevatus.—Shell horn-color, finely striate; whirls four, as high as wide; last whirl well rounded, very distinctly carinate below; inclination to the left about 48°; right side convex, flattened at the apex; left side very deeply concave; suture deeply impressed; aperture round-ovate, large, with its upper extending much beyond its lower margin. Greatest breadth .17 inch, least breadth .13 inch, height .06 inch. Cabinets of Bost. Soc. Nat. Hist., of Middlebury College, of S. S. Haldeman, of Marietta, Pa.; of J. G. Anthony, of Cincinnati, and my own.

Fig. 225.

Planorbis elevatus.

Habitat. This species was discovered in the summer of 1838, in a small spring in a rocky cavity, in South Boston. Nearly a hundred specimens were obtained, and a much larger number were left. Visiting the same spot a few days since (July, 1840), I found the spring filled up with stones to the top of the water, and not a shell to be seen. Last summer I obtained a specimen in Lake George, N. Y. Dr. Wm. Prescott has found the species in Lynn.

This species much resembles *P. parcus*, Say, and for some time I doubted whether it was distinct. But the specimens uniformly differ from that shell in having the spire elevated above the plane of the last whirl, whereas in that species it is concave, and consequently this species is much more deeply umbilicated on the left side; also, that species is distinctly carinate on the middle of the last whirl, but is very indistinctly carinate below the middle, if at all. (*Adams.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8181	1	Ruby Valley.	Capt. J. H. Simpson.	.....
8182	4	Apple Creek.	.....	.....
8183	21	Northern Georgia.	A. Gerhardt.	.....
8184	5	Big Sioux.	.....	.....
8185	34	Maine.	Dr. J. Lewis	.....
8186	7	Marietta, O.	W. Holden.	.....
8187	13	Apple Creek, lat. 47°.	.....	.....
8188	7	Yellowstone River.	.....	.....
8189	70	Mohawk, N. Y.	Dr. J. Lewis.	.....
8503	200	New York.	"	Cabinet series.
9117	5	Moose Factory.	Drexler.	.....
9087	8	Fort Simpson.	Kennicott.	.....
8512	6	Ann Arbor, Mich.	A. Winchell.	(*Pl. elevatus?*)
8509	6	.....	W. G. Binney.	Named *Pl. concavus*
9295	1	Otter Tail Creek, Min.	Kennicott.	[by Anthony.

Planorbis arcticus, Beck.—Shell dextral, horn-colored, thin, convex and excavated in the centre above, concave below; three and a half cylindrical whirls. Diam. 2, 2‴. (*Möller, l. c.*)

Planorbis arcticus, Beck in Möller, Ind. Moll. Grön. 5.—Mörch, Moll. Grön. 76.

I have not been able to obtain any authentic specimen for figuring. The only published description is copied above.

Spurious Species of Planorbis.

Planorbis armigerus and *P. wheatleyi* are *Segmentine.*

Planorbis parallelus, Say, J. A. N. S. II, 164: Binney's ed. p. 63, is *Helix lineata* (q. v.). Authentic specimens among Ferussac's shells in the Garden of Plants are so labelled, as Dr. Gould informs me.

Planorbis niger. I know nothing of this species mentioned as new, with no description, by DeKay in New York Zoological Report of Dec. 20, 1839, p. 32.

Planorbis complanatus, from Western Lakes, is mentioned by name only by Ravenel, Cat. of Shells, p. 11. A foreign species has been described under this name.

Planorbis obtusa, Lea, is mentioned by Wheatley, Cat. of U. S. Shells, 2d ed., p. 22, without description, giving Ohio as habitat. The name is pre-occupied also.

Planorbis eburneus, Chemn., is quoted doubtfully as synonym of *Pl. bicarinatus* in Beck's Index, p. 118, as is

Planorbis subcarinatus, Say (p. 119), of North America, without description, *Physa anceps* of Menke being doubtfully cited as synonym (Lister, Hist. cxxxix, 44): Delaware River; and *subdistortus* as another variety.

Planorbis fovealis, Beck (Ind. 119): Delaware River. No description is given, but reference to Lister, Hist. cxl, f. 47.

Planorbis capillaris, Beck (Ind. 119): Mexico; and *Planorbis fuliginosus,* Beck (Ind. 120): Mexico. No description.

Planorbis evacuus, Villa = *P. exacutus?*

Planorbis glans, DeKay = *Glandina truncata.*

Planorbis alba? Sheppard (Trans. Lit. and Hist. Soc. Quebec, I, 195, 1829).—Shell umbilicated on both sides; upper part of whirls flat, lower convex; aperture wide and angular. (Near Quebec.) = *Plan. albus,* Müll. ?

It is the *Helix alba,* Lin., but is not among Lamarck's species. (*Sheppard.*)

Planorbis spirorbis, Sheppard (Trans. of Lit. and Hist. Soc. Quebec, I, 195, 1829).—"One side flat, the other subumbilicate, reverse; horn-colored. (Near Quebec, at Etchemin.)" (*Sheppard.*)

I do not know anything of this species, whether it is the *P. spirorbis* of Europe or not.

Fossil Species of Planorbis.

Dr. Meek furnishes me with the following list of fossil species:—

Planorbis spectabilis, Meek, Proc. Phila. Ac. 1860, 315.
Planorbis utahensis, Meek, Proc. Phila. Ac. 1860, 314.
Planorbis vitrinus, Meek & Hayden, Proc. Phila. Ac. 1860, 413.
Planorbis nebrascensis, Evans & Shumard, Proc. Phila. Ac. 1854, 154.
Planorbis vetulus, Meek & Hayden, Proc. Phila. Ac. 1860, 175.
Planorbis convolutus, Meek & Hayden, Proc. Phila. Ac. 1856, 120.
Planorbis planoconvex, Meek & Hayden, Proc. Phila. Ac. 1860, 452.
(Olim *fragilis*, Meek & Hayden, Proc. Phila. Ac. 1857, 136, not of Dunker.)
Planorbis subumbilicatus, Meek & Hayden = *Valvata subumbilicata*, q. v.

SEGMENTINA, Fleming.

Tentacles filiform. Foot narrow anteriorly, larger behind.

Shell dextral, discoidal, spire depressed, horn-colored; whirls few, visible on both sides, furnished internally with transverse, testaceous partitions or teeth; aperture transversely oval or circular; outer lip simple.

Jaws (of *S. lacustris*) very narrow, very much arched, flexible, scarcely brown, greatly attenuated, pointed. Vertical striæ or marginal denticulations hardly apparent.

Lingual membrane — ?

There are but few species of *Segmentina*, which are not acknowledged as a separate genus by all authors. The name either as generic or subgeneric is universally adopted, as it has priority of *Hemithalamus*, Leach, *Segmentaria*, Swains., and *Discus*, Hald.

The typical forms are not represented in this country—our two species belonging to the section *Planorbula*.

Subgenus **PLANORBULA**, Hald.

Shell with the aperture furnished with dentiform plicæ, not forming open partitions.

Segmentina wheatleyi, Lea.—Shell small, dark horn-colored, flat, obsoletely striated, bicarinate, depressed above, broadly and deeply

umbilicated below; whirls five, obtusely carinated above, below acutely so; aperture white, thick, strongly constricted; within are six teeth.

Fig. 226.

Segmentina wheatleyi.

Fig. 227.

Segmentina wheatleyi.

Cotoma Creek, Montgomery Co., Ala. (*Lea.*)

Planorbis wheatleyi, Lea, Pr. Phila. Acad. Nat. Sc. 1858, p. 41.

I have specimens received from Florida, which, on comparison with Mr. Lea's type, are evidently the same. It is a well-marked species, nearly allied to *Seg. armigera*, but distinguished by its carination, &c., and by the body whirl being continued beyond the thickened, heavy lip, making it "duplicatim continuatum," like that of *Helicina tropica*. The shell figured was given me by Mr. Lea.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9123	2	Florida.	I. Lea.	Figured.

Segmentina armigera, Say. — Shell dextral, brownish horn-color, wrinkles obsolete; spire perfectly regular, slightly concave; suture well impressed; umbilicus profound, exhibiting the volutions; whirls four, longer than wide, obtusely carinated above, carina obsolete near the aperture, a carina beneath continued to the aperture; aperture longitudinally subovate, oblique; labrum blackish on the edge; throat armed with five teeth, placed two upon the pillar side, of which one is large, prominent, perpendicular, lamelliform, oblique, and rounded abruptly at each extremity; near the anterior tip is a small prominent conic acute one; on the side of the labrum is a prominent lamelliform tooth near the base, and two slightly elevated, oblique, lamelliform ones above. Length $\frac{1}{4}$ of an inch nearly.

Fig. 228.

Segmentina armigera.

Fig. 229.

Segmentina armigera.

Inhabits Upper Missouri.

Remarkable by the teeth, but these are only discoverable by the microscopical examination of the mouth, and they are situated far within it. (*Say.*)

Planorbis armigerus, Say, Jour. Acad. Nat. Sc. II, 164 (1818): Binney's ed. p. 63.—Haldeman, Mon. 30, pl. iv, f. 11–13 (1844).—Gould, Invert. 205, f. 138 (1841).—Adams, Shells of Vt. 155 (1842).—DeKay, N. Y. Moll. 62, pl. iv, f. 64 *a*, *b*, *c* (1843).—Mrs. Gray, Fig. Moll. An. cccx, f. 2.—Anony. Can. Nat. II, 205, fig. (1857).

Segmentina armigera, H. & A. Adams, Gen. Rec. Moll. II, 264, pl. lxxxiv, f. 4.

Planorbella armigera, Chenu, Man. de Conch. II, 283, f. 3570.

Haldeman says "the teeth are present when the shell is a line in length, and as but one set exists in full grown individuals, we must infer that they are absorbed and reproduced from time to time. In overgrown specimens like those figured, it sometimes happens that the teeth are wanting; as if, after their absorption, the energies of the animal were too far exhausted to reproduce them. The outer ones seem to be formed successively from left to right, the small one on the right appearing last, and in its absence, the shell has been described by Say and Gould as being but five-dentate."

Ranges from the Eastern through the Middle, Western, and Northwestern States, and as far north as Peace River.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8196	11	Milwaukee, Wis.	I. A. Lapham.	.....
8197	50	.....	Dr. J. Lewis.	.....
8497	9	New York.	"	Cabinet series.
9116	10	James Bay, B. A.	Drexler.	.....
9070	20	Hudson's Bay.	"	.....
8970	..	Fort Resolution.	Kennicott.	.....
9274	17	Great Slave Lake.	"	.....

Subfamily ANCYLINÆ.

Shell non-spiral, conical, limpet-like.

All the known genera of *Ancylinæ* are represented in North America except *Latia*, which has a spiral shell and a transverse septum in the aperture.

ANCYLUS, Geoffroy.

Fig. 230.

Animal of *Ancylus*.

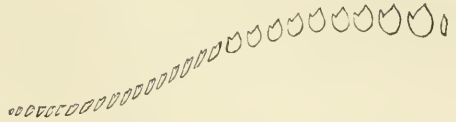
Tentacles triangular, mantle included; pulmonary orifice protected by a branchial appendage. Foot large.

Shell sinistral, thin, patelliform, depressed, non-spiral, apex directed to the right; aperture very wide; peritreme continuous, simple, entire.

Jaws three, covered with papillæ, one superior, small, transversely oblong, two lateral, long, very slightly arcuate, contiguous to the superior.

Lingual membrane broad; teeth crowded, numerous; central

Fig. 231.



Lingual dentition of *Ancylus newberryi*.

minute, narrow, simple; laterals broad, bicuspid, the inner cusp the larger.

The *Ancyli* and *Arcroloxi* are widely distributed over the globe. In North America the known species are most numerous in those States where conchological observations have most been made, but an equal number may be found in other regions when they come to be explored. They are found in the extreme north and in Mexico, at every station.[1]

The name *Ancylus* is universally adopted at the present time.

The shell of *Ancylus* is dextral, the apex being directed to the right, but the generative, respiratory, and anal orifices are on the left of the animal, as in *Planorbis*.

So slight are the points of specific distinction in the species of this genus, and so meagre is the material at my disposition, I have considered it best at present to give all the descriptions of species yet published, leaving the synonymy to be decided upon at another time.

Ancylus obscurus, HALDEMAN.—Shell ovate, somewhat elevated, rather wide, apex but slightly projecting, rather more than one-third of the shell posterior; lateral margins slightly convex; lateral slopes rectilinear; posterior slope with a very slight depression; anterior slope nearly rectilinear. Color dark brown, margin diaphanous. Dimensions: long. 5, lat. 3.5, elev. 1.5 mill. Found in Nolachucky River, below Greenville. (*Haldeman.*)

Fig. 232.

Ancylus obscurus.

Ancylus obscurus, HALDEMAN, Mon. 9, pl. i, f. 5 (1844).

Adams quotes it from Jamaica (Contr. to Conch. 50); Shuttle-

[1] Dr. J. G. Cooper found them 7100 feet above the sea on the Sierra Nev da.

worth (in Berne Mittheil., 1854, p. 93) quotes it from St. Thomas, Jamaica, and Porto Rico.

Ancylus fuscus, Adams.—Shell thin, transparent without the epidermis, not much elevated, elliptical, moderately curved at the sides; epidermis brown, visible through the shell, giving it the appearance of having the same color, thick, rough, slightly extending beyond the margin of the shell; apex obtuse, moderately prominent, scarcely behind the middle, inclining to the right so as to have only two-fifths of the width on that side. Length .31 inch, width .22 inch, height .05 inch. Cabinets of Bost. Soc. Nat. Hist., of Mr. Kinne Prescott of Andover, and my own.

Fig. 233.

Ancylus fuscus.

Habitat and station. This species was found adhering to stones in a small rivulet, at Andover, by Mr. Kinne Prescott, to whom I am indebted for many interesting species of shells. It has also been found at Mansfield.

This species is easily distinguished by its epidermis. The *A. rivularis*, Say, differs also in being much more narrow, having its sides straight, and its apex more acute; and *A. tardus*, Say, is more elevated, and in both of these the apex does not incline so far to the right as in our species. The *A. lacustris*, Drap., is more narrow, with an apex more elevated and acute, and *A. fluviatilis*, Drap., has the apex more prominent and nearer one extremity. (*Adams.*)

Ancylus fuscus, Adams, Bost. Journ. Nat. Hist. III, 329, pl. iii, f. 17 (1840); Am. Journ. Sc. [1], XXXVIII, 396 (1840).—Haldeman, Mon. 12, pl. i, f. 7 (1844).—Gould, Inv. 224, f. 152 (1841).—DeKay, N. Y. Moll. 13 (1843).—Anony. Can. Nat. II, 212, fig. (1857).

The original description and figure are copied above. It has also been found in Ohio and the District of Columbia.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8819	20+	Massachusetts.	W. Stimpson.	Cabinet series.
8531	3	Ohio.	I. A. Lapham.	.....

Ancylus elatior, Anthony.—Shell very much elevated, ovate; lines of growth distant, conspicuous; color light green, opaque; apex decuticated, recurved, sub-central; anterior and posterior slopes convex; lateral slopes plane; apical region rose colored.

Fig. 234.

Ancylus elatior.

Hab. Green River, Kentucky, adhering to small stones and dead shells. Very rare. My cabinet; cab. Lyc. N. H. Length .26 inch (6½ mill.), breadth 0.21 inch (5 mill.), height .14 (3½ mill.).

Obs. 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 specimens of the genus with which I am acquainted.

It is somewhat singular that this should have been the only species of *Ancylus* noticed on a journey of nearly eighteen hundred miles, during which every stream was examined for shells, and this genus was anxiously sought for. (*Anthony.*)

Ancylus elatior, ANTHONY, Ann. N. Y. Lyc. VI, 158, pl. v, f. 20–21 (1855).

Mr. Anthony's description and figure are copied above.

Ancylus diaphanus, HALDEMAN.—Shell thin in texture, diaphanous, very wide, nearly circular, depressed; apex obtuse, almost central! Slope scarcely convex. Color very pale olivaceous, translucent, aperture white. Long. 5.5, lat. 4.5, elev. 2 mill. Fig. 235.

Discovered in Ohio, by Mr. Anthony.

Distinguished by its circular and flattened form, and central inconspicuous apex. (*Haldeman.*)

Ancylus diaphanus.

Ancylus diaphanus, HALDEMAN, Mon. No. 3, p. 3 of cover, 1841; p. 8, pl. i, f. 4 (1844).—DEKAY, N. Y. Moll. 13 (1843).

Also said to have been found in Wisconsin.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8530	2	Milwaukee, Wis.	I. A. Lapham.	Cabinet series.

Ancylus haldemani, BOURGUIGNAT.—Shell small, oval, elliptic' pale, thin in texture, depressed; ends similarly curved, sides convex, slope nearly rectilinear; apex obtuse, with more than one-third the shell behind it. Long. 4, lat. 2.5, elev. 1.5 mill. Fig. 236.

Houston River, in Washington County, southwestern Virginia.

Paler, more depressed, and with a less prominent apex than *A. rivularis* and *tardus;* posterior slope less concave than in the former, and not direct, as in the latter. (*Haldeman.*)

Ancylus haldemani.

Ancylus haldemani, BOURGUIGNAT, Pr. Zool. Soc. London, 1853, p. 83.
Ancylus depressus, HALDEMAN, Mon. 6, pl. i, f. 12 (1844).

On the authority of Bourguignat's Memoir on *Ancylus, l. c.*, I adopt another name for this species. There is an *A. depressus* of Deshayes, 1824 (*vide* Encycl. Méth. II, 48), and of Keferstein, 1834.

Ancylus sallei, Bourguignat.—Shell convex anteriorly, posteriorly rectilinear or slightly convex; left side convex, right side rectilinear; posterior apex declining to the right, its summit obtuse so as to be quite indiscernible. Shell small, very fragile, diaphanous, very finely radiated, yellowish. Aperture oblong, 1½ mill. high, 5 mill. long, 2 mill. broad.

Found by Mr. Sallé on fragments of decaying wood in the Laguna Larga de Toxpam, near Cordova, Vera Cruz. (*Bourguignat.*)

Ancylus sallei, Bourguignat, Mag. de Zool. 1857, 16.

I have seen no specimens of this species. The original description is translated above.

Ancylus parallelus, Haldeman.—Shell pale, thin, and delicate; lengthened; sides subrectilinear, diverging slightly forwards; apex rather sharp, conspicuous, with two-fifths of the shell posterior to it. Dimensions: Long. 0.25, lat. 0.15, elev. 0.08 inch (Adams).

Fig. 237.

Ancylus parallelus.

Inhabits New England.

In general appearance resembles *Velletia lacustris*, Müll., of Europe, but is at once distinguishable by having the apex directed towards the right. Professor Adams remarks: "It was supposed to be Say's *A. rivularis*, not on account of any resemblance between the two shells, but from the meagreness of the description. From some remarks of this learned naturalist, comparing *A. rivularis* with *A. tardus*, it seems probable that the former is not an elongate species." (*Haldeman.*)

Ancylus parallelus, Haldeman, Mon. pt. 2, p. 3 of cover (1846); p. 11, pl. i, f. 6 (1844).—Adams, Shells of Vt. 164 (1842).—DeKay, N. Y. Moll. 13 (1843).

Ancylus rivularis, Gould, Inv. of Mass. 224, f. 153 (1841), teste Haldeman.—Anon. Can. Nat. II, 212, fig. (1857).

Dr. Gould's *Ancylus rivularis* is considered by Haldeman to be this species and not *A. rivularis*, Say.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8818	4	Massachusetts.	W. Stimpson.	Cabinet series.

Ancylus rivularis, Say.—Shell corneous, opaque, conic-depressed, apex obtuse, nearer to and leaning towards, one side and one end; aperture oval, rather narrower at one end, entire; within milk-white. Length one-fourth of an inch. Cabinet of the Academy.

Fig. 238.

Ancylus rivularis.

Common; adhering to stones in rivulets; the animal resembles the inhabitant of shells of the genus *Limnæa*, the tail is very obtuse, rounded. (*Say.*)

Ancylus rivularis, Say (Oct. 1819), J. A. N. S. I, 125 (1819); Nich. Enc. ed. 3: ed Binn. p. 60.—Haldeman, Mon. 4, pl. i, f. 1 (1844). —DeKay, N. Y. Moll. 12, pl. v, f. 98 *a*, *b* (1843).—Mrs. Gray, Fig. Moll. An. cccx, f. 5.—Not of Gould (= *A. parallelus*).

Also noticed in Virginia and Wisconsin. The figure is copied from Haldeman.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8223	5	Milwaukee, Wis.	I. A. Lapham.	.....
8492	1	.....	J. G. Anthony.	Cabinet series.

Ancylus tardus, Say.—Shell conic depressed; apex behind the middle obtuse, rounded, inclining backward but not laterally; line from the apex to the posterior tip rectilinear; line from the apex to the anterior tip arcuated; aperture oval, not distinctly narrowed at one end. Length a little over three-twentieths (4.25), breadth one-tenth of an inch.

Fig. 239.

Ancylus tardus.

Differs from *A. rivularis*, Nob., which has the apex leaning towards one side, and the aperture narrower at one end. It is less elongate than *fluviatilis*, Drap., which has an acute and laterally inclined apex.

It inhabits the Wabash River. (*Say.*)

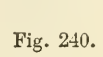
Ancylus tardus, Say, N. H. Diss. Jan. 15, 1840,; Descr. 26: ed. Binney, 149.—Haldeman, Mon. 7, pl. i, f. 3 (1844).—Adams, Shells of Vt. 164, fig. (1842).—DeKay, N. Y. Moll. 13 (1843).

Mr. Say's type is in the collection of the Philadelphia Academy. The species is said to have been found also in Vermont and the District of Columbia. The figure is copied from Haldeman.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8529	50	Mohawk, N. Y.	Dr. J. Lewis.	Cabinet series.

Ancylus calcarius, DeKay.—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, extending beyond the edge of the aperture; within, bluish-white, darker towards the apex. Length 0.3, height 0.12.

Fig. 240.



Ancylus calcarius.

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 this latter, chiefly on account of its solid, calcareous structure. I am indebted to Mr. I. Cozzens for the specimens from the Passaic River, near Paterson, but it will doubtless be found in this State. (*DeKay.*)

Ancylus calcarius, DeKay, N. Y. Moll. 13, pl. v, f. 99 *a*, *b* (1843).

Fig. 240 is copied from one of DeKay.

Ancylus pattelloides, Lea.—Shell large, thick, elliptical, spotted, obliquely conical; striæ minute, crowded; apex submedial.

Fig. 241.

Ancylus pattelloides.

Arroya San Antonio, California: Dr. Trask. (*Lea.*)

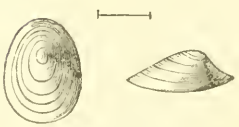
Ancylus pattelloides, Lea, Proc. Acad. Nat. Sc. Phila. 1856, VIII, 80.

Fig. 241 is copied from Mr. Lea's original specimen. The species seems nearest allied to *A. crassus*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8577	3	.....	.....	Cabinet series.
9203	1	San Francisco.	Judge Cooper.	(Really this species?)
9339	5	Canoe Creek, Cal.	Newberry.	.....

Ancylus kootaniensis, Baird.—Shell ovate, ashy, concentrically striate, vertex anterior, obtuse, shining within. Length $\frac{1}{4}$, breadth $\frac{1}{4}$ inch.

Fig. 242.



Ancylus kootaniensis.

Hab. Rivers Kootanie and Spokane, British Columbia. Brit. Mus.

The shell is of an ovate form, and is concentrically striated, though the striæ only appear on the lower two-thirds of its surface, the apex being smooth and shining. Internally the shell is shining and somewhat pearly. (*Baird.*)

Ancylus kootaniensis, Baird, Proc. Zool. Soc. London, 1863, 69.

The above description is copied from the original. Fig. 242 is drawn from the advance plates of the Report of the British Boundary Commission.

Fig. 243.

Ancylus caurinus.

Ancylus caurinus, Cooper.

Ancylus caurinus, Cooper, in Reports on Nat. Hist., &c., of Minnesota, Nebraska, Washington, &c., p. 378 (1859); P. R. R. XII, 378.

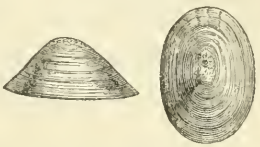
Black River, near Puget Sound.

The shell figured is from Judge Cooper's collection. No description of it was ever published.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9098	1	California.	Judge Cooper.	Type figured.

Ancylus newberryi, LEA.—Shell large, obtusely pyramidal, opaque, smoky red, sides somewhat compressed; apex sub-central; aperture elliptical.

Fig. 244.



Ancylus newberryi.

Klamath Lake, California: Dr. J. S. Newberry. (*Lea.*)

Ancylus newberryi, LEA, Proc. Acad. Nat. Sc. Phila. 1858, 166.

The figures I have given above are from authentic specimens of *A. newberryi.* They are the size of the shell, which is extremely large for the genus.

It was from this species that the Fig. 231, on page 139 was drawn.

The lingual membrane is composed of 72 rows—55 denticles in a row; central tooth minute, laterals bidentate; uncini irregularly denticulated.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9337	1	California.	.....	Fig. 244. Type.
9338	..	.....	.....	Lingual membrane figured. Fig. 231.

Ancylus crassus, HALDEMAN.—Shell coarse, somewhat ponderous, wide, ovate, elevated, lines of growth conspicuous; apex eroded, placed far back; anterior and lateral slopes convex, posterior slope steep and rectilinear. Color opaque chestnut-brown. Dimensions: Long. 8, lat. 6.25, elev. 3 mill.

Fig. 245.

Ancylus crassus.

Brought from Oregon by Mr. Nuttall.

Distinguished by its opacity and thick texture—all the preceding species being more or less translucent and delicate. (*Haldeman.*)

Ancylus crassus, HALDEMAN, Mon. p. 14, pl. i, f. 8 (1844).

Fig. 245 is copied from Haldeman's, whose description is also given above.

Ancylus fragilis, Tryon.—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. Size of the largest specimen: Length 4, breadth 1.15, height 1 mill. Most of the specimens do not exceed two-thirds of the dimensions.

Fig. 246.

Ancylus fragilis

Laguna Honha, California: Rev. J. Rowell. My cabinet, and cabinet of Mr. Rowell.

This species is smaller, thinner, and wants the convex lateral margins of our *Anc. rivularis*, Say. It agrees with that shell, however, in the greater width of its anterior end, while in the shape of its lateral margins it resembles *Anc. parallelus*, Hald. It is much the smallest of our species. (*Tryon.*)

Ancylus fragilis, Tryon, Proc. Phila. Acad. Nat. Sc. 1863, 149, pl. i, f. 15.

Mr. Tryon's description and figure are copied above.

Doubtful Species of Ancylus.

Ancylus drouetianus, Bourguignat.—Shell slightly convex anteriorly, straight posteriorly; summit small, sharp, contracted on its sides, recurved and resting on the posterior wall of the shell, a support which does not always secure it from fracture. Apical depression invisible on account of the apex being bent backwards. Shell very smooth, shining, transparent and horn-colored; surface divided into fifteen triangular compartments, commencing at the apex and enlarging towards the base of the shell, the dividing ridge marking the peristome in an undulating manner. Length 6, height 2–2½, breadth 5 mill.

Fig. 247.

Anoylus drouetianus.

Habitat unknown, but from its characteristics probably belonging to North America. Dedicated to my friend Henry Drouet of Troyes.

Belonging to the group of *A. crassus*, *radiatilis*, *rivularis*, &c., but easily distinguished by its triangular divisions and undulating peritreme. Its apex and mode of growth also distinguish it from *A. riparius* and *vitraceus*, which share its other characteristics just mentioned, though they have a very apparent apical depression. (*Bourguignat.*)

The above description and figure are copied from Bourguignat's Memoir on *Ancylus* (Proc. Zool Soc. 1853, p. 92, pl. xxv, f. 10–17).

Having never seen or heard of any such species in the United States, I doubt its existence there, but have given the description and figure to facilitate its recognition should it be found.

Ancylus filosus is an *Acroloxus*.

ACROLOXUS, Beck.

Tentacles and mantle as in *Ancylus?* Foot large.

Shell dextral, elongated, oblong, patelliform, non-spiral; apex near the middle, directed to the left; aperture very wide; peritreme continuous, simple, entire.

Jaws (of *A. lacustris*) covered with crowded papillæ; upper large, quite arched, laterals rather high, but little approached, narrow, attenuated and pointed below.

Lingual membrane with a central tooth, and twelve lateral teeth on each side, then one tooth of a different form, and lastly six more on each side.

Acroloxus has a sinistral shell, the apex being on the left, but the orifices of the animal are on the right. It further differs from *Ancylus* in its lingual dentition.

The name *Vellettia* is sometimes used for this genus, because Beek gave no description of *Acroloxus*. He gives, however, a list of species sufficiently well known to make the generic distinction evident.

I follow the same plan as in *Ancylus* in giving all the original descriptions and figures of this genus.

Acroloxus nuttallii, Hald.—Shell fuscous, oval, elevated, apex one-fourth of the entire length from one end. Length $\frac{3}{10}$, breadth $\frac{1}{4}$, height $\frac{1}{8}$ inch.

Oregon: Mr. Nuttall. (*Haldeman.*)

Vellettia nuttallii, Haldeman, Mon. pt. 3, p. 3 of cover (1841).—DeKay, N. Y. Moll. 13 (1843).

This is the only known recent species of North American *Acroloxus*, unless *Ancylus filosus*, Conrad, should prove one.

Ancylus filosus, Conrad.—Shell regularly oval, rather elevated, with numerous radiating prominent lines; apex very prominent, inclined, eroded, not nearly central.

Fig. 248.

Ancylus filosus.

Inhabits the Black Warrior River, south of Blount's Springs, Alabama. It is abundant on various species of *Melania*. (*Conrad.*)

Ancylus filosus, Conrad, N. Fr. W. S. p. 57 (1834): ed. Chenu, p. 26.—Haldeman, Mon. p. 10, pl. i, f. 9 (1844).

—DeKay, N. Y. Moll. 13 (1843).—Müller, Syn. Test. 1834 prom. p. 2 (1836).

In the plate referred to, Prof. Haldeman calls this species a *Vellettia*. In the text he placed it in *Ancylus*. I have copied his figure.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8950	..	Alabama.	J. G Anthony.	Cabinet series.

Fossil Species of Acroloxus.

Dr. Meek gives me the following name of a fossil species:—

Acroloxus minutus, Meek & Hayden MSS. (*Ancylus minutus*, Proc. Acad. 1856, p. 120.)

GUNDLACHIA, Pfeiffer.

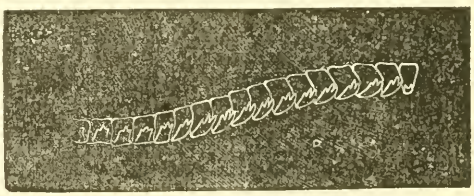
Tentacles — ? Mantle — ? Foot — ?

Shell thin, ancyliform, non-spiral, obliquely conical; apex inclined backwards, basal side two-thirds closed with a flat, horizontal lamina; aperture anterior, horizontal, semicircular; peritreme continuous, simple, entire.

Jaw — ?

Lingual membrane (of *G. californica*) with a small bicuspid

Fig. 249.



Lingual dentition of *Gundlachia californica*.

central, and 16, oblique, tricuspid lateral teeth.

This is a strictly American genus as far as is now known, species having been described from the West Indies and Central America. In the Boston Proc. 1863, 249, will be found an extremely interesting account by Dr. Stimpson of the growth of the animal.

Gundlachia californica, Rowell.—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 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 about sixteen one hundredths, breadth eight one hundredths, and height six one hundredths of an English inch.

Fig. 250.

Gundlachia californica.

More than fifty specimens were found on water plants in clear stagnant ponds, two or more often sticking on the back of a larger one.

The discovery of this little shell in California is of great interest, the only species hitherto known being found in Cuba. The generic characters of this shell are strictly parallel with that species, while those mentioned as specific easily distinguish it. The Cuban shell is more elongated, regularly oval, the apex projecting considerably beyond the margin of the aperture, which is not obliquely expanded posteriorly. Its size is about one-fifth larger than that of ours. According to Bourguignat, the young shell is a simple obtuse cone, with a semicircular aperture formed by the edge of the shelf, and the thickened dorsal margin; but as it grows the animal changes the form of the aperture until the opening beneath the shelf becomes like the small end of a broad funnel, which in some of our specimens is still shown by the white semicircular ring.

The shell much resembles that of the marine *Crypta* (*Crepidula*), and also *Navicella* of tropical estuaries; but the animal is quite different in the Cuban species, and will undoubtedly prove so in the Californian. (*Rowell.*)

Gundlachia californica, Rowell, Proc. Cal. Acad. Nat. Sc. III, 21, March, 1863.

I have seen no specimen of this shell whose original description and figure are copied above. Fig. 251 is drawn from an authentic specimen received by Dr. J. G. Cooper.

Fig. 251.

Gundlachia californica.

From one of the same lot the lingual membrane figured on page 148 was drawn.

Gundlachia meekiana, Stimpson.—The full-grown shell, in general form, is ovate. It is much broader than in *G. ancyliformis*, and has a less ovate aperture than in *G. californica*, as may be seen by comparison of the figures. The shell consists of two distinct parts, and from above looks very much like a small and thick, black *Ancylus*, sticking obliquely and to the right upon the posterior end of the back of a larger thin and whitish one. These two parts we will call, for convenience, respectively the smaller shell and the larger shell. The two parts nearly resemble each other in outline, each being oblong, roundedly truncate before, and narrowed and somewhat obliquely truncated behind, the right posterior angle being prominent. The dorsal part, or smaller shell, as before stated, is black opaque, and comparatively thick. It is about one-third as long as the larger shell, and has the usual form of a young *Ancylus*, the very obtuse apex being at the posterior third of its length and inclined to the right. Anteriorly it is continuous with the dorsum of the larger shell, but posteriorly it projects freely over and beyond the margin of that shell, at its posterior dexter angle, at a distance equalling rather less than a fourth of its own length. Inferiorly, the entrance of this projecting portion of the smaller shell is closed by a flat septum, extending from margin to margin, and continuous anteriorly with the dorsum and internal shelf of the larger shell presently to be described.

Fig. 252.

Gundlachia meekiana.

The larger shell is thin, translucent, presenting signs of rapid growth, and usually of a whitish or very pale horn-color. It is more expanded to the left than to the right, the dorsum and left slope being strongly convex, while the right slope is nearly straight. It is marked with prominent striæ of growth and indistinct radiating lines. Within, at the narrower posterior end, there is a rather strong white shelf, formed by the soldering of the dorsum of the larger to the septum of the smaller shell, which extends forward and upward, nearly to the bottom of the concavity, leaving, however, an aperture which leads into the cavity of the smaller shell, in which the liver of the animal is seated. This aperture is exactly semilunar in shape, its longer diameter being of course coincident with the width of the smaller shell and equalling about one-third that of the larger shell. In younger specimens the shelf is a little less extensive, and the apical aperture somewhat larger.

The soft parts of the animal, except in the form of the visceral sack, agree so closely with those of true *Ancyli*, that I have not succeeded in finding any differences of importance. I add here a figure of its lingual

dentition. This resembles very nearly that of a species of *Ancylus* common in the District (which appears to be the *A. rivularis* of Say and Hal-

Fig. 253.

Lingual dentition of *Gundlachia meekiana*.

deman), differing from it only in having two or three teeth less in number, and in the more numerous denticles with which its lateral teeth are armed.

After a close examination of the above characters, I have ventured to suggest that the *Gundlachia* commences its life as an *Ancylus;* the smaller shell, in which the earlier period 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.

This 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 period of greatest activity in growth with all the fresh-water Pulmonates—the animal throws forth its newer and larger shell, retaining the older one on its back for the protection of its more tender viscera. It therefore will be a matter of great interest and importance to observe these animals in the latter part of winter, when the formation of the newer shell is about to commence. At that period, they will be found to present the primary form, namely, that 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.

This remarkable little mollusk, of a genus new to our Fauna, has occurred to me in one locality only, a small pond of clear water, in a marshy bank of the Potomac, on the northern side, between Georgetown and the Little Falls in one direction and between the canal and the river on the other. The pond is about one mile below the so-called "Chain Bridge." Five specimens only were found after repeated search.

I have dedicated this species to my friend, Mr. F. B. Meek, the most accurate of American investigators in Fossil Conchology, the pleasure of whose company I enjoyed during several excursions for the purpose of procuring specimens of it. (*Stimpson.*)

Gundlachia meekiana, Stimpson, Proc. Bost. Soc. 1863, 249, fig.

Suborder THALASSOPHILA.

Eyes sessile on the front part of the frontal disk formed by the expanded tentacles. Operculum sometimes present. Animal marine, or living in the vicinity of the sea.

There are two families now known to belong to this suborder, one of which, *Amphibolidæ*, is not represented in this country; species belonging to it are furnished with an operculum and are still more marine in their habits than the *Siphonariidæ*. Still, they have the lingual dentition of Pulmonata, the mantle margin nearly closed, and but rudiments of gills.

Family SIPHONARIIDÆ.

Lingual membrane broad, rather long; teeth numerous, equal, in slightly arched, cross lines; the central tooth narrow, elongated, with a small, rhombic apex; the lateral teeth larger, diverging, gradually diminishing in size towards the outer side of the series, and furnished with a rather oblique, curved tip. Head with a large frontal disk, bilobed in front, and formed by the expanded tentacles; eyes sessile on the outer side of the disk. Respiratory orifices covered by a large fleshy lobe of the mantle.

Operculum none. Shell conical, patelliform, with an internal groove on the right side.

The *Siphonariidæ* are marine in their habits, living near the sea, on rocks between tide marks, or higher above the water but dashed by the spray.

The single genus of the family is represented in this country.

SIPHONARIA, Blainv.

Shell trumpet-like, orbicular, depressly conical; apex subcentral, oblique, recurved posteriorly; aperture wide, margin irregular, crenulated; muscular impression crescentic; a syphonal groove on the right side, which is extended in a projection beyond the margin.

Hermannsen uses the name *Siphonaria* in preference to *Liria*, Gray

The *Siphonariæ* are marine, being found adhering to rocks between tide marks; they have a widely extended geographical range, but are most numerous in the tropics.

Siphonaria alternata, Say.—Shell conical, with upwards of thirty obsolete, hardly raised, unequal ribs; apex obliquely curved, the tip pointing nearly in a parallel direction with the surface of the shell, and acute; color brown, radiated with white; base oval. Breadth three-tenth inch.

Fig. 254.

Siphonaria alternata.

Inhabits the southern coast of East Florida.

It seems to approach the *leucopleura*, as described by authors, excepting that the base is not ovate, as the base of that shell is said to be. (*Say.*)

Patella alternata, Say, Journ. Acad. Nat. Sc. V, 215 (1826): ed. Binney, 124.

Siphonaria alternata, Say (1832), Am. Conch. IV, pl. xxxviii: Binney's ed. p. 192, pl. xxxviii; ed. Chenu, 50, pl. xiii, f. 3.

I have not seen this species. Fig. 254 is copied from Say's figure.

Siphonaria æquilirata, Carpenter.—Shell sub-conic, oval, regular, radiately ornamented with numerous subrugulose, equal ridges, the interstices being narrow and smooth; dark olive, ridges high; epidermis thin, adherent; internal surface dusky, hardly iridescent; edge crenulated; canal subcentral, scarcely showing exteriorly. Length .83, breadth .57, height .3.

Fig. 255.

Siphonaria æquilirata.

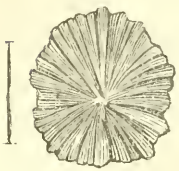
One specimen of beautiful growth in the Mazatlan collection agrees with a larger but somewhat irregular one in that of Mr. Cuming, in characters which appear to separate it from all varieties of *S. lecanium*. Riblets equal, interstices smooth, channel nearer the middle and not conspicuous either by swelling or special marking outside. The Mazatlan specimen has much broader interstices than that of Mr. Cuming; but as the riblets are bifurcating, it is probably not fully grown. There is no trace of striulæ. The examination of more specimens may possibly merge it into the polymorphous *S. lecanium*, from the extreme variety of which the non-prominence of the canal appears to separate it. (*Carpenter.*)

Siphonaria æquilirata, Carpenter, Maz. Cat. 184.—Reeve, Con. Icon. 15.

Gulf of California. Mazatlan. Fig. 255 is copied from Reeve.

Siphonaria amara, Reeve.—Shell ovate, depressly conoid, apex anteriorly uncinate, radiately closely ribbed and ridged; black, rayed with white bands.

Fig. 256.



Siphonaria amara.

Chiefly to be recognized by its white rays upon a cinder black ground. (*Reeve.*)

Siphonaria amara, Reeve, Con. Icon. 33.

California. Reeve's description and figure are given above.

Siphonaria lecanium, Philippi.—Shell small, usually ovate, sometimes subcircular, projecting at the channel; subconic or very much depressed; ash-colored, variously colored with red; epidermis thin, adherent; ribs at unequal or regular intervals, subacute or very much rounded, the intervals usually with more delicate riblets; stronger ribs from twelve to twenty-two; both ribs and riblets delicately marked by radiating, subrugose striæ; ribs and internal margin sometimes white; apex sub-central, smooth, flattened; interior black or brown, more rarely white, very rarely greenish; margin irregularly crenulated or stellate; rounded ribs projecting; channel declining. Length of the largest flattened form (including palmations) .96, lat. .89, alt. .18; of a sub-conical specimen, .76, alt. .24 inch.

Mazatlan. (*Carpenter.*)

Siphonaria lecanium, Philippi, Z. für Mal. IV, 51 (1846).—Carpenter, Br. Mus. Cat. Reig. 182 (1856).

The above is Mr. Carpenter's description of an extremely variable species. He suggests the flattened form with stout, rounded, projecting palmate ribs should be called var. *palmata.*

Limnæa stagnalis. (See p. 28.)

Fig. 257 represents the lingual dentition of a specimen lately

Fig. 257.

Lingual dentition of *Limnæa stagnalis.*

received from the Lake of Geneva. There are 100 rows of 47 . 1 . 47 teeth each.

Bulinus berlandierianus.—Shell cylindrical, smooth, whitened, rather thick; whirls five, the upper ones narrowly flattened, the lower one comprising more than fifteen-seventeenths of the whole length of the shell; quite compressed; aperture very long, narrow; columella simple, with a light callus. Length 17, greatest breadth 8; of aperture, length 14, breadth 4 millimetres.

Fig. 258.

Bulinus berlandierianus.

Bulinus berlandierianus, W. G. Binney, Am. Journ. of Conch. I, 51, pl. vii, f. 8.

Texas, in the region of Matamoras.

Six specimens were presented to the Smithsonian Institution by Gen. Couch, among the shells collected by Berlandiére.

Fig. 259.

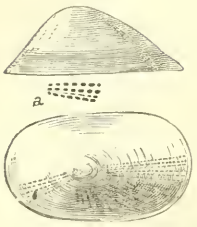
Bulinus hypnorum.

This species resembles *Bulinus clatus*, Gld., more than any other known to inhabit North America. But that species is very much thinner and delicate, has a longer, more pointed spire, a shorter aperture and more convex body whirl.

Fig. 259 is drawn from the largest American specimen of the widely distributed *Bulinus hypnorum*. It shows how slight is the resemblance to that species in *B. berlandierianus*.

Ancylus borealis, Morse.—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 .14 inch, breadth .09 inch, height .06 inch.

Fig. 260.



Ancylus borealis.

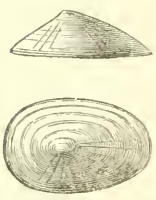
This species resembles *A. tardus* in its general form. It is much smaller, however, and has a strong heavy shell.

Discovered by John M. Gould, at Patten, in the northern part of the State. (*Morse.*)

Ancylus borealis, Morse, Journ. Portland Soc. I, 45, f. 103, 104.

Acroloxus ovalis, Morse.—I propose this and the following species with some reluctance, as the specific characters of nearly all the species of this genus are but faintly marked, and the danger of multiplying false species is but too apparent; still, believing these to be new, I present them.

Fig. 261.



Ancylus ovalis.

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 fifty-five delicate ribs, which radiate from the apex to the periphery of the shell. Length .12 inch, breadth .10 inch, height .06 inch.

This species was discovered by John M. Gould, in the Androscoggin River, at Bethel, Maine, in 1854. I have since found it in the above locality clinging to the under side of stones near the shore, in positions where it could in no way reach the surface of the water. (*Morse.*)

Ancylus ovalis, Morse, Journ. Portland Soc. I, 44, f. 101, 102.

The descriptions and figures of this and the preceding species are copied from Morse.

On p. 103, before Planorbis, the following should be inserted:—

Subfamily PLANORBINÆ.

Shell spiral, discoidal or depressed, many whirled; aperture crescentic.

INDEX.

In the present index all synonyms and spurious species are in italics. Where several references are given for one name, the first generally relates to the page containing the full description.

SMITHSONIAN MISCELLANEOUS COLLECTIONS.

144

LAND AND FRESH-WATER SHELLS

OF

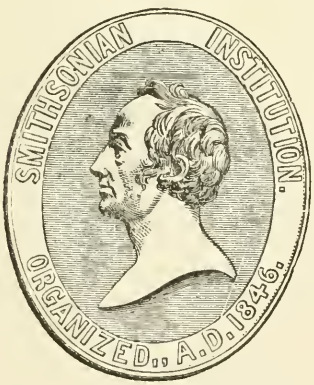
NORTH AMERICA.

PART III.

AMPULLARIIDÆ, VALVATIDÆ, VIVIPARIDÆ, FRESH-WATER RISSOIDÆ, CYCLOPHORIDÆ, TRUNCATELLIDÆ, FRESH-WATER NERITIDÆ, HELICINIDÆ.

BY

W. G. BINNEY.



WASHINGTON:
SMITHSONIAN INSTITUTION.
SEPTEMBER, 1865.

PREFACE.

This volume, prepared at the request of the Smithsonian Institution, is devoted to all the operculated land and fresh-water mollusks of North America, excepting the family of *Melanians*. The descriptions of the *Cyclophoridæ*, *Truncatellidæ*, and *Helicinidæ* have already been published in the "Terrestrial Mollusks of the United States," Vols. 2 and 4. It will be seen, however, that these families are now grouped according to their lingual dentition and breathing organs, and not collectively as *Pneumonopoma*. In treating the fresh-water families, it has been considered better to give the original description, or an English translation of it, and a fac-simile in outline of the original figure of each species and synonym. This work must, therefore, be considered rather as a report on the present state of our knowledge of the subject. When the large area over which the species range shall have been explored and full suites of specimens obtained of every age, variety and locality, and when this volume shall have elicited criticism and prompted research, a complete monograph may then be prepared on the decisions of which the student can fully rely as correct.

An extensive correspondence with all the living American conchologists, and opportunities of examining the original specimens from which the descriptions of almost all the species were drawn, have enabled me to eliminate from the list of species a large number of synonyms. The original description and figure of these being given, the student can judge for himself of the correctness of my conclusions.

The descriptions of families and genera of the *Viviparidæ* and *Rissoidæ* are adopted from Dr. Stimpson, those of the former from his manuscript, of the latter from a paper entitled "Researches on the Hydrobiinæ and Allied Forms," lately published

by the Smithsonian Institution. In the remainder of the work the descriptions of the "Genera of Recent Mollusca have been adopted."

The original figures of shells and lingual dentition were drawn by Mr. E. S. Morse, of Gorham, Maine.

The subject is brought down to January, 1864.

W. G. BINNEY.

Burlington, N. J., September, 1865.

CONTENTS.

III.

SYSTEMATIC INDEX.

LAND AND FRESH-WATER SHELLS

OF

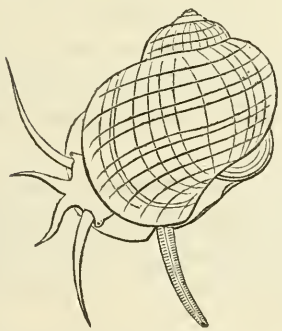
NORTH AMERICA.

III.

Family AMPULLARIIDAE.

Lingual membrane with seven series of teeth (3, 1, 3), central teeth acute, lateral subulate. Rostrum divided into two long tentacular lobes in front; tentacles long and filiform; eyes on peduncles at the outer bases of the tentacles. Mantle with a more or less elongated siphon on the left side in front; left gill rudimentary; mantle cavity with a large pulmonary sac on each side. Rectum not traversing the heart. Foot simple. Operculum annular, regular. Shell spiral, turbinate, covered with an olivaceous epidermis; aperture simple in front. Jaws present.

Fig. 1.



Animal of *Pomus depressa*, reduced one-half.

Fig. 2.

Lingual dentition of *Pomus depressa*.

The *Ampullariidæ* are fluviatile, and represent in the ponds and rivers of the tropics the *Viviparidæ* of more temperate climates. Although distinct gills exist, the respiratory cavity is very large and partly closed, so as to enable these animals to live a long time out of water; in fact, they appear to be

truly amphibious, and to be enabled to survive a long drought, and have been known to revive after having been kept several years out of water. The long siphonal tube appears to be formed by the left neck-lappet, which is seen in the *Viviparidæ* in a rudimentary state.

But one genus of this family is represented in North America. In order, however, that the others may be understood by those not having access to the more recent works on general Conchology, I have added below the descriptions of H. & A. Adams.

Genus **Ampullaria.**—Respiratory siphon elongate. Operculum horny, with an external shelly coat. Shell globose, umbilicated; spire small, last whirl ventricose; aperture oblong, entire, peristome continuous, slightly reflexed, with an internal thickened rim or ledge.

Genus **Pomus,** Humphrey, characterized as below.

Genus **Marisa,** Gray.—Siphon elongate. Operculum horny, dextral. Shell dextral, depressed, discoidal, deeply and widely umbilicated; spire very short, whirls rounded; aperture suborbicular, entire, peristome thin, simple.

Genus **Pomella,** Gray.—Operculum horny, dextral. Shell solid, spire short, whirls transversely striated, the last very large; aperture semi-ovate, inner lip concave, broad, flattened, peritreme simple, acute.

Genus **Lanistes,** Montfort.—Operculum horny, sinistral, or with the nucleus on the left margin. Shell depressed, thin, sinistral, deeply and widely umbilicated; spire short; aperture oblong, entire; inner lip expanded over the last whirl, peristome simple, acute.

Genus **Meladomus,** Swainson.—Operculum horny, sinistral. Shell sinistral, thin, imperforate, covered with a dark olivaceous epidermis; spire produced, acuminated; aperture oval, reversed, contracted and acute posteriorly, entire in front, peristome thin, simple.

Genus **Asolene,** D'Orbigny.—Siphon not exposed. Operculum horny, with an internal shelly coat. Shell globose, solid; spire small, whirls rounded; aperture oval, entire; inner lip slightly thickened, peritreme simple, acute.

POMUS, Humphrey.

Siphon elongate. Operculum horny, dextral. Shell dextral, globose, widely umbilicated, last whirl very large, ventricose; spire short; aperture entire, oblong, large, expanded, peritreme simple, always thin, sometimes subreflexed.

Fig. 3.

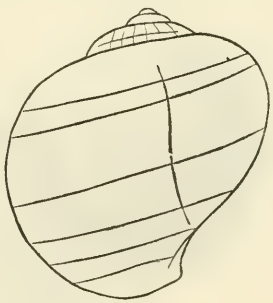
Pomus depressa.

The genus *Pomus* differs from *Ampullaria* in the absence of the thickened ledge within the peritreme for the operculum, which latter, moreover, is entirely horny. The species inhabit the lakes and rivers of warm countries, more especially those of South America and the West Indies. In the dry season they bury themselves deeply in the mud, where they remain in a state of torpidity, and, on account of their possessing a pulmonary cavity in addition to the gills, they are enabled sometimes to survive a considerable period after having been removed from the water. The South American Indians term them "Idol Shells," and are said to hold them in great veneration.

Pomus depressa, Say.—Shell ventricose, subglobular, obsoletely banded with obscure green; whirls four, slightly wrinkled; body whirl more prominent above, somewhat flattened towards the suture, of a pale olivaceous color, which is almost concealed by numerous unequal, longitudinal and transverse greenish and brownish lines; spire very much depressed; aperture suboval, within somewhat glaucous, on the margin exhibiting the bands distinctly; labrum simple, as much rounded above as below; umbilicus small, nearly closed. Greatest width one inch and nine-twentieths, total length one inch and a half; length of the aperture one and one-fifth of an inch nearly.

Inhabits East Florida.

Fig. 4.



Ampullaria depressa.

During an excursion to East Florida, in company with Messrs. Maclure, Ord, and T. Peale, I obtained a single dead and imperfect specimen of this interesting shell. It occurred in a small creek, tributary to St. John's River, and on the plantation of Mr. Fatio. Captain Le Conte, of the Topographical Engineers, has since presented me with a perfect specimen, with the information that he observed them in very great numbers on the shores of Lake George, a dilatation of St. John's River; that in some places the dead shells were piled up confusedly to a considerable height, and that the *Numenius longirostra* feeds upon the living animal. The spire is still less elevated than that of the *globosa* of Swainson.

Ampullaria depressa.—As the name *depressa* of the Appendix to Long's Exped. p. 264, is preoccupied by Lamarck for a fossil species, it may be changed to *paludosa*. (*Say.*)

Ampullaria depressa, Say, Long's Ex. 264, pl. xiv, f. 2; Binney's ed. p. 130, pl. lxxiii, f. 2.—Haldeman, Mon. p. 5, pl. i, ii.—De Kay, N. Y. Moll. 124.—Hanley, Conch. Misc. pl. iii, f. 9.—Philippi, in Chemn. ed. 2, p. 52, pl. xvi, f. 4.

Ampullaria paludosa, Say, New Harm. Diss. II. 260; Desc. 22; Binney's ed. p. 147.

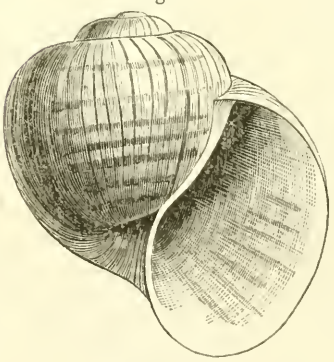
Ampullaria hopetonensis, Lea, Tr. Am. Phil. S. V, 115, pl. xix, f. 84; Obs. I, 227.—DeKay, N. Y. Moll. 124.—Reeve, Con. Icon. fig. 60.—Philippi, in Chemn. ed. 2, p. 36, pl. ix, f. 7.

Figure 5 represents the lingual dentition of a specimen of *Pomus depressa* kindly furnished me by Prof. Agassiz. The teeth are light brown in color, and make thirty-four rows in all; the first and second laterals are notched and the third is simple. The central tooth has seven denticles, the central one quite large, the next two short and blunt, and the last rather long and blunt.

Fig. 5.

Lingual dentition of *Pomus depressa*.

Fig. 6.



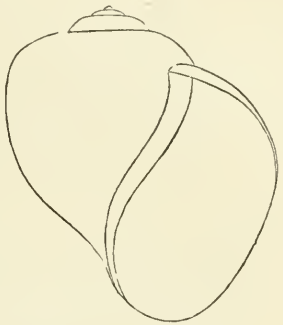
Pomus depressa.

Mr. Say proposed the name *paludosa* because his first name, *depressa*, was preoccupied by Lamarck, An. s. Vert. 1822. Since, however, that *Ampullaria depressa*, Lam. has been removed to the genus *Natica*, I adopt Mr. Say's first name. Figs. 1 and 3, represent the animal and operculum of this

species, the former, copied from Haldeman, being reduced in size. Fig. 4 is a fac-simile of the outline of Say's figure, and fig. 7 of Mr. Lea's of *A. hopetonensis*. Fig. 6 represents a specimen from Georgia. I have no doubt of the identity of this last named species with *depressa* after examining the typical specimen. No. 8986 and 8987 were labelled by Mr. Lea as *hopetonensis*. Haldeman also places it in the synonymy. The original description here follows, and an outline of the figure (7).

Ampullaria hopetonensis.—Shell subventricose, smooth, flattened above, umbilicate, yellowish-brown, banded; sutures impressed; whirls 5; aperture subovate, white.

Fig. 7.



Ampullaria hopetonensis.

Habitat Hopeton, near Darien, Ga. Prof. Shepard. My cabinet; cabinet of Prof. Shepard. Diam. 1.4, length 1.7 inch. I owe to the kindness of Prof. Shepard of New Haven this interesting shell. It was procured by him during his late geological investigations in our Southern States, with other shells, descriptions of which will be found in these memoirs. It resembles the *A. fasciata*, Lam., but is less globose, the whirls of our species being somewhat flattened on the side and top. It differs from the *A. depressa*, Say, described in Major Long's Exp. to St. Peter's River (subsequently changed to *A. paludosa* in the Disseminator) in being less globose, and in being flatter on the side and superior part of the whirls. (*Lea.*)

Inhabits Georgia and Florida.

In the preliminary Report on N. Y. Moll. 1839, 32, *A. paludosa* is included erroneously.

DeKay gives as synonyms *A. penesima*, Say, and *A. disseminata*, Say. The names do not occur in Say's writings, though the last is suggestive of the periodical in which the description of *A. paludosa* appeared. Dr. Martens (Mal. Blatt. IV, 204) refers *A. depressa* and *A. paludosa* to *A. hopetonensis*, disregarding the priority of Say's names.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8984	2	Florida.	W. G. Binney.	.....
8986	1	Silver Spring L., Fla.	O. M. Dorman.	.....
8987	1	" " "	W. G. Binney.	.....
8988	1	Georgia.	J. G. Anthony.	.....
9306	..	"	L. Agassiz.	Lingual. Fig. 5.

Spurious and Extra-limital Species of Ampullariidæ.

This family does not appear to belong to the molluscous fauna of the United States, but rather to that of South America. I have not, therefore, included the Mexican species.

Ampullaria crassa, Deshayes. Vide *Melantho ponderosa*.

Ampullaria borealis, Valenciennes, in Humboldt and Bonpland, Rec. d'Obs. II, 260, is probably *Lunatia heros*, Say. Ferussac (Bull. Zool. 1835, 2d sect. p. 33), in reviewing Valenciennes' work, refers it to a large marine *Natica* figured by Chemnitz. The description is as follows:—

"Shell ventricose, globose, heavy, thick, smoky white, broadly umbilicated, with longitudinal striæ but no wrinkles.

St. Pierre and Miquelon, near Newfoundland.

This species resembles *Am. guyanensis*. Its proportions are the same; it is longitudinally striate, but its shell is at least three times as thick, so that it is quite heavy. It is also distinguished by its very large umbilicus, while *A. guyanensis* has none. The color is yellowish or light reddish on the top of the last whirl; the base is white."—*Valenciennes*.

Ampullaria rotundata, Say.—Shell remarkably globose; length and breadth equal, dark brown, but becoming olivaceous towards the aperture; spire but little elevated; suture moderately impressed; body whirl a little undulated instead of being wrinkled; these undulations being very perceptible to the finger within the shell; aperture within on the margin thickened equally all round, and fulvous, with a slight groove for the reception of the operculum, hardly visible but palpable; within somewhat perlaceous; a little darker on the columella; umbilicus small, narrow; operculum calcareous, deeply and concentrically rugose, so as to appear stratified; nucleus on the side towards the labium submarginal. Length less than one inch and four-fifths; greatest breadth about the same.

For this interesting species we are indebted to Captain Leconte, of the Topographical Engineers, who informed me that he found it in St. John's River, in Florida.

It is most closely allied to the *A. globosa*, Swainson, a native of the rivers of India. But that shell is rather less globose, and does not appear to have the almost regular, but slightly elevated and very numerous undulations so perceptible towards the aperture on the body whirl of this species; which has also a few hardly perceptible, distant, brownish bands, particularly towards the base. It may, however, be only a variety of that species. (*Say.*)

Ampullaria rotundata, Say, N. Harmony Diss. II, 245; Discr. 27; Binney's ed. p. 147, pl. lxxv.—Philippi, in Chemn. ed. 2, p. 68.

Ampullaria globosa, Haldeman, Mon. p. 8.—Swainson, Zool. Ill. II, 119.

I do not consider this and *Vivipara elongata* well established American species. If actually found in Florida, they were probably brought from Calcutta, where they both are found.

Ampullaria urceus, Müller (*A. rugosa*, Lam.), is found in Mexico. (Vid. Humboldt & Bonpland, Rec. d'Obs. II, p. 258.) Of its presence in the Mississippi Mr. Say says: The "*Ampullaria urceus, L.* (*rugosa*, Lam.) is stated in the books to inhabit the Mississippi River; but I have never been so fortunate as to find it, or to gain any information relative to it there. Mr. O. Evans did me the favor to make inquiry at various places on that river, and to exhibit, as somewhat similar, a colored plate of the *A. globosa*, Swains., to persons from whom information might be expected, and amongst others to some Indians, who in general are known to be accurate observers; but no one has seen any similar shell in the waters of the Mississippi. I am therefore much inclined to believe that the species is a native of some of the more southern rivers, probably those of Texas. Any information in relation to it, or specimens of the shell, will be very acceptable." (Binney's ed. p. 195.) See also Haldeman, Mon. p. 11; Montfort, Conch. Syst. II, p. 244; Lamarck, An. s. Vert. &c.

Ampullaria flagellata, Say, N. H. Diss. II, 260; Descr. 22; Binney's ed. p. 147.—Haldeman, Mon. p. 10.—Philippi, in Chemn. ed. 2, p. 38, pl. ix, f. 7. Near Vera Cruz (Mexico).

Ampullaria flatilis, Reeve, Con. Icon. pl. vii, fig. 31 (1856). Tobasco, Mexico

Ampullaria cerasum, Hanley, Conch. Misc. Mexico.

Ampullaria miltocheilus, Reeve, Con. Icon. fig. 120. Chiapa, Mexico.

Ampullaria Ghiesbreghti, Reeve, Con. Icon. fig. 123. Chiapes, Mexico.

Ampullaria fumata, Reeve, Con. Icon. 124. Chiapes, Mexico.

Ampullaria violacea, Valenciennes, Rec. d'Obs. II, 260.

Ampullaria reflexa, Swainson, Phil. Mag. LXI, 377.

Ampullaria malleata, Jonas, Moll. Beit. I. 22.

Ampullaria paludinoides, Crist., and Jan in Chemn. ed. 2, p. 27.

Ampullaria scalaris, d'Orb. Mag. de Zool. 1835, p. 31. (*A. angulata*, Jay, Cat. earlier ed., not of Dunker.)

Pomacea linearis, Perry, Conchology, pl. xxxviii, fig. 2.—Shell pale reddish-brown, slightly spotted with pale pink spots; mouth slightly shaded with a broad band of brown reaching round the body; the rim yellow. The shell is found on the coasts of North America, and is drawn from a specimen in the collection of Mr. Stuart. (*Perry.*)

This is the original description, and a copy of Perry's figure reduced one-half. I know nothing of the species.

Fig. 8.

Pomacea linearis.

FOSSIL SPECIES.

Ampullaria ? perovata, CONRAD, Proc. Acad. Nat. Sc. Philad. III, 21, pl. i, fig. iii.

FAMILY VALVATIDAE.

Lingual membrane with teeth in seven series (3, 1, 3); the central teeth broad, with a hooked and denticulated apex,

Fig. 9.

Lingual dentition of *Valvata tricarinata*.

the lateral lanceolate, hooked and denticulated. Rostrum produced; tentacles cylindrical; the eyes sessile at their external bases. Mantle simple in front; gill plumose, exposed, the lamina pinnate, spirally twisted, protected by a long, slender respiratory lobe. Foot bilobed in front. Operculum horny, orbicular, spiral, many whirled; whirls with a thin elevated edge. Shell spiral, turbinate or discoidal, covered with an epidermis; aperture with the peritreme entire.

Fig. 10.

Operculum of *V. tricarinata*, greatly magnified.

The species of this family are distributed throughout the temperate regions of the globe, living in slow running rivers, ditches, and lakes.

I have copied Haldeman's figure of *Valvata sincera* to illustrate the animal of this family (fig. 11).

VALVATA, O. F. MÜLL.

Fig. 11.

Valvata sincera, greatly magnified.

Shell turbinate or discoidal, umbilicated, thin, whirls round, simple or keeled, covered with a horny epidermis; aperture circular, peristome continuous.

The species of this small genus inhabit the ponds and ditches of Europe and North America. When the animal progresses, the delicate, retractile, branchial plume is projected over the neck. The female

deposits her eggs in a single, coriaceous, spherical capsule, which is affixed to stones or the stems of aquatic plants. Jaws present.

Valvata tricarinata, Say. — Shell with three volutions; three revolving, carinate, prominent lines, giving to the whirls a quadrate instead of a cylindric appearance. Suture canaliculate, in consequence of the whirls revolving below the second carina and leaving an interval. Spire convex, apex obtuse. Umbilicus large. Carinæ placed, one on the upper edge of the whirl, one on the lower edge, and the third on the base beneath. Breadth one-fifth of an inch.

Inhabits the river Delaware. Rare. Found by Mr. Le Sueur, whose proposed name is here adopted. (*Say.*)

Cyclostoma tricarinata, Say, J. Acad. N. S. Phil. I, 13, 1817; Nich. Ency. ed. 3; Binney's ed. p. 68, 59, 56.

Valvata tricarinata, Say, Journ. Acad. II, 173; Binney's ed. 68.—Deshayes in Lam. VIII, 507; Tr. El. de Conch. pl. lxxii, f. 4–6.—Menke, Zeit. f. Mal. 1845, p. 121.—Haldeman, Mon. III, pl. i, f. 1–4.—Gould, Invert. 225, f. 156.—DeKay, N. Y. Moll. p. 118, pl. vi, f. 130. Anonymous, Can. Nat. II, 213, fig.—Adams, Thompson, VI, 152.

Valvata carinata, Sowerby, Gen. Shells, xli, f. 2.

Valvata unicarinata, DeKay, N. Y. Moll. 118, pl. vi, f. 129.

Valvata bicarinata, Lea? Tr. Am. Phil. Soc. IX, 21; Obs. IV, 21; Proc. II, 81, 83; Arch. f. Nat. 1843, II, 129.

Tropidina carinata, Chenu, Man. de Conch. II, 312, fig. 2232.

Troschel (*Gebiss der Schnecken*, p. 96, pl. vi, f. 14) figures the lingual ribbon of this species.

Fig. 12.

Lingual dentition of *Valvata tricarinata.*

This is a very variable species, as shown by No. 8981 of the collection. Variety *simplex* is contained in No. 8982; bicarinated forms in 8941. Mr. Say's specimens of *Valvata tricarinata* are still preserved in the collection of the Philadelphia Academy of Natural Sciences. From an examination of them and of Mr. Lea's original *Valvata bicarinata* I am convinced of the identity of the two. I have given (fig. 13) a figure of Mr. Lea's shell and his description below. Haldeman refers it with doubt to *tricarinata.*

Fig. 13.

Valvata tricarinata.

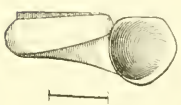
I have not seen authentic specimens of the other species men-

tioned in the synonymy. The original descriptions and fac-similes of the original figures now follow.

Valvata bicarinata, Lea.—Shell orbicular, flattened above, bicarinate, rather thick, horn-colored above, whitish below, widely umbilicate; sutures impressed; spire depressed; whirls four, convex; aperture rounded, whitish within.

Body rather short and white, head large, tapering, slightly enlarged at the anterior termination, with a black mark passing from the neck between the eyes, tapering off and reaching nearly to the end of the snout, where there are two oblique black marks bordered in front by white, and accompanied behind by several irregular white spots, the anterior ones being the larger. Branchia translucent, superior portion blackish, bordered with white spots and occasionally obtruded; eyes round and deep black, placed at the posterior base of the tentacula, surrounded by a white area; tentacula long, rather tapering, obtuse at the end; filament rather short, translucent with longitudinal white lines; foot wide and furcate anteriorly, where minute white spots may be observed. Operculum thin, semitransparent, light horn color, increment circular and rather coarse.

Fig. 14.



Valvata bicarinata.

Schuylkill River, west side, below Permanent Bridge. H. C. Lea. My cabinet. Diam. .30, length .12 inch.

In the form of the shell, this species closely resembles the *tricarinata*, Say. It differs in having but two carinæ, in having a wider umbilicus, and the spire is more depressed. The animals of the two species differ in form and color more than the shells.

The head of the *tricarinata* is more cylindrical and enlarged at the termination, where it somewhat resembles the snout of the hog, while that of the *bicarinata* is more conical and without so sudden an enlargement at the end. The color of the *bicarinata* is lighter. In the black markings they also differ. In the *tricarinata* there is a single blotch anterior to the area between the eyes. In the *bicarinata* this extends also behind this area; and in addition may be observed two quite black marks above the mouth, which the *tricarinata* does not seem to have. The tentacula of the *bicarinata* are larger and more filiform. When in motion, the anterior portions of the lobes of the foot are pointed, and recurved or hooked.

The shell of the *bicarinata* is quite light colored beneath, and rather a dark horn color above, the change of color taking place a short distance above the periphery of the whirl, between which and the superior carina it is quite dark. The superior carina is large and erect, the inferior one is smaller. All the whirls are visible beneath. Very minute longitudinal striæ cover the whole surface.

Having several living specimens of both these species, I observed them closely with a lens while under water in a glass vessel. On the 15th of May, while I had a *tricarinata* at the focus of my lens, I observed a small

apple green, globose object, passing from under the aperture of the shell. This was shortly followed by others, and soon a transparent gelatinous mass became visible. This mass was passed slowly over the right side of the neck, under the pectiniform movable branchiæ, until entirely discharged against the perpendicular side of the vessel in which it was kept, and there the mass remained attached, the parent having abandoned it immediately. The time was fifteen minutes from the first appearance of the mass until it was fairly discharged. The green globules were the ova, of which I counted thirty in the transparent, globose gelatinous mass, which was not more in diameter than one-twentieth of an inch, the transverse diameter of the shell being about four-twentieths of an inch. In other cases, I found the number of ova to differ; some masses having only ten or twelve.

On the 23d (eight days after), the ova were so far advanced as to be changed to a dull faded green, the mass enveloping them having changed by degrees in transparency, and becoming of a slightly ferruginous color. As yet, no change of bulk or arrangement was observed.

On the 29th (fourteen days after), the mass was observed to be opened, and with a lens of considerable power I could plainly see a motion in most of the ova, the rounded form of the shell being easily discerned within.

On the 30th (fifteen days after), most of the young shells had broken their filmy bonds, only six or seven remaining: their motion was very apparent, and their minute black eyes could be plainly seen. I observed to-day, for the first time, that the *Valvata* has the power of swimming, inverted from the surface of the water, like the *Planorbes*, *Physæ*, &c. Most of the young were in that position, and could move comparatively fast. The action of the mouth in the adult, when swimming in this way, was constant, and changed from an oval to a circular form.

From the above observations, we may conclude that the *Valvata tricarinata* requires from fourteen to fifteen days to be perfected in the ovum, from the time it is ejected and abandoned by its parent. The *bicarinata*, I have no doubt, requires the same time. Numerous globules were deposited about the glass, which globules appeared all to resemble each other, and nearly all the individuals were of the species *bicarinata*. (*Lea.*)

Fig. 15.

V. carinata.

Valvata carinata, Sowb., l. c., is figured only; no description is given (fig. 15).

Fig. 16.

Valvata unicarinata.

Valvata unicarinata, DeKay.—Shell small, apex depressed; whirls 3 or 4, impressed with minute incremental striæ, all flattened above and bounded by a revolving rib or keel, which in the younger individuals ascends to the summit: aperture circular, nearly vertical, scarcely modified by the keel; opercle corneous, thin, with concentric striæ; umbilicus wide, profound, exhibiting all the volutions; color milky bluish-white; apex often tinged with rufous. Height .1, diam. .15.

These dimensions are from one of the largest size, obtained from Lake Champlain, where they are very abundant, and from the Erie Canal. It is allied to the preceding (*V. tricarinata*), and forms the passage to *V. sincera*. Some eminent conchologists suppose this, and perhaps the following (*V. sincera*) to be mere varieties of *V. tricarinata*. It approaches the *V. humeralis*, Say, from Mexico; but it is smaller, not so much depressed, and has a wider umbilicus. (*DeKay.*)

I have evidence of its ranging at least from New England and Pennsylvania to Council Bluff and Methy Lake, lat. 57°.

Haldeman says the ova are deposited from the first day of March to the end of July, in transparent masses half a line in diameter, each containing a number of germs of a bright green color dotted with yellow.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8978	150+	Mohawk, N. Y.	Dr. J. Lewis.	.....
8979	1	Ann Arbor, Mich.	Prof. Winchell.	.....
8980	10	Milwaukee, Wis.	I. A. Lapham.	.....
8981	20+	Herkimer, N. Y.	Dr. Lewis.	vars.
8982	20+	Little Lakes, N. Y.	"	var. simplex.
8937	6	" "	"	" "
8941	5		"	var. bicarinata.
8938	5	Burlington, N. J.	W. G. Binney.	.....
9058	50+	Grand Rapids, Mich.	Dr. Lewis.	.....
9059	100+	Schuyler's Lake.	"	.....
9060	100+	Mohawk River.	"	.....
9061	20	Little Lakes, N. Y.	"	.....
9293	2	Otter Tail Creek, Min.	R. Kennicott.	.....
9292	5	Great Slave Lake.	"	.....

Valvata sincera, Say.—Shell subglobose-conic; whirls nearly four, accurately rounded, finely and regularly wrinkled across; aperture not interrupted by the penultimate whirl, nor appressed to it, but merely in contact with it, the labrum not diminished in thickness at the point of contact; umbilicus large, exhibiting the volutions. Breadth less than 1-5 inch.

Fig. 17.

V. sincera.

Inhabits Northwest Territory.

For this species I am indebted to Dr. Bigsby. It is very similar to the *tricarinata*, Nobis, but it is destitute of carinated lines and the umbilicus is rather larger; it differs from the *obtusa* of Europe also, in the much greater magnitude of the umbilicus. (*Say.*)

Valvata sincera, Say, Long's Ex. 264, pl. xv, f. 11; Binney's ed. p. 130, pl. lxxiv, f. 11.—Haldeman, Mon. p. 6, pl. i, f. 5–10.—Adams, Sh. of Vt. in Thoms. Vt. p. 152; Am. Jour. Sc. [1], XL, 267.—DeKay, N. Y. Moll. 119, pl. vi, f. 127, 128.

Valvata depressa, pars, Küster in Chemn. ed. 2, p. 88 (1852).—Menke, Zeit. für Mal. II, 122, 1845 (including *tricarinata* and *simplex*).

Valvata striata, Lewis, Pr. Phil. Ac. N. Sc. 1856, p. 260.

The outline figure published by Say and copied in my figure 16 is not very satisfactory, nor have I ever seen specimens referred to this species which can easily be distinguished from ecarinate forms of *V. tricarinata.* Fig. 11 is a view of the animal copied from Haldeman. Kirtland quotes it from Ohio.

I give also a figure of a specimen of *V. striata* furnished by Dr. Lewis. I have no doubt of its identity with *V. sincera.* The name is preoccupied by Philippi, Enum. Moll., p. 157. Dr. Lewis' description is as follows:—

Valvata striata.—Shell conical, depressed, umbilicate; aperture round; epidermis brown and very regularly striate. Has all the other features of *sincera* except color and translucency. Animal not observed. Very rarely seen. Of several hundred specimens of *Valvata* only seven were this species. (*Lewis.*)

Fig. 18.

V. striata.

No. 8936 of the collection was labelled *V. sincera* by Dr. R. E. Griffith.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8985	3	Madison, Wis.	I. A. Lapham.	.....
8936	..	.....	Phil. A. N. S.	Cabinet series.
9296	2	Peace River.	.....	.....
9297	7	Upper Mackenzie R.	.....	.....
9294	13	Great Slave Lake.	Kennicott.	.....

Valvata pupoidea, Gould.—Shell small, elongate-ovate, opaque, chestnut-colored, when divested of the rough, dirty pigment which usually adheres closely to it; whirls four or five, minutely wrinkled, the posterior one small and flattened so as to form an obtuse apex; the others cylindrical, and so partially in contact as to expose about one-half of the cylinder; the last entirely disjoined from the preceding one for at least the half of a revolution; aperture circular, lip simple and sharp; on looking at the shell from below, no umbilical opening is found; operculum horny, apex central, elements concentric. Length .1, breadth 3-40 inch.

Fig. 19.

Valvata pupoidea.

Found at Fresh Pond and other ponds, on stones and submerged sticks; and has been for many years in our cabinets marked as a *Paludina.*

Animal very active; head proboscidiform, half as long as the tentacles, bilobed in front, dark, terminated with light; tentacles rather stout, light drab-colored, with a line of silvery dots on the upper side, over the large, black eyes; foot, tongue-shaped, as long as the first whirl, dilated into two acute angles in front, light drab-color; respiratory organ occasionally protruded to half the length of a tentacle on the right side.

This species is widely distinguished from all other described ones by its minuteness, its color, its elongated form, and its want of an umbilicus; of

which characters the last two seem to arise from the loose manner in which the whirls are united. (*Gould.*)

Valvata pupoidea, Gould, Am. Journ. Sc. 1st ser. XXXVIII, p. 196, 1840; Invert. of Mass. p. 226, f. 155; Otia, 180.—Haldeman, Mon. p. 10, pl. i, fig. 11-13.—DeKay, N. Y. Moll. 119.—Chenu, Man. de Conch. II, 311, fig. 2230.—Anonymous, Can. Nat. II, 214, fig.

Fig. 19 is an enlarged view of one of Dr. Gould's figures. Found also in Connecticut (*Linsley*), District of Columbia (*Girard*), Maine (*Mighels*), and Canada (*Can. Nat. i. c.*).

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8993	5	Massachusetts.	Dr. J. Lewis.	.....
8992	3	"	W. Stimpson.	Cabinet series.

This species is made the type of a new genus *Lyogyrus*, by Mr. Gill. (Proc. Ac. Nat. Sci. Phil. 1863.) It does not appear to me that there are sufficient grounds for believing it distinct.

Valvata humeralis, Say.—Shell subglobose, depressed; spire convex, not prominent; whirls three and a half, with the shoulder depressed, plane; wrinkled across, or rather with slightly raised lines; aperture appressed to the penultimate whirl, but not interrupted by it; umbilicus rather large. Greatest breadth, less than one-fifth of an inch.

Inhabits Mexico.

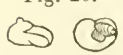
Differs from *V. sincera*, nob. of the Northwest Territory, in being more depressed, and in having a shoulder or plain surface near the suture. The umbilicus is larger than that of the *V. piscinalis*, Müll., and the spire more depressed; that species is also destitute of the depressed shoulder. (*Say.*)

Valvata humeralis, Say, New Harm. Diss. II, 244; Descr. 22. Binney's ed. p. 148.—Haldeman, Mon. p. 9.—Menke, Zeit. für Mal. II, 129.

This Mexican species, not noticed since Mr. Say found it in Mexico, has been quoted from Canada by Bell, Whiteaves, &c. They probably refer to a variety of *V. tricarinata.* Compare *V. virens.*

Valvata virens, Tryon.—Shell turbiniform, consisting of four well rounded whirls; 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. Height .5; diam. maj. .5, min. .4; of aperture, length 2.5, breadth 2 mill.

Fig. 20.



Valvata virens.

Clear Lake, California. Wm. M. Gabb. My cabinet, and cabinet of Mr. Gabb. A number of specimens of this species are before me, most of them being about two-thirds grown. It has no American[1] analogue. (*Tryon.*)

Valvata virens, Tryon, Proc. Phila. Acad. Nat. Sci. May, 1863, 148, pl. i, fig. 11.

I have added to the fac-similes of Mr. Tryon's figures (Fig. 20) an enlarged view of the shell and operculum of this species in Fig. 21.[2] The peculiar greenish color of the shell distinguishes it from the other American species. The description may be compared with that of *V. humeralis*, given above.

Fig. 21.

Valvata virens, greatly enlarged.

Cat. No	No. of Sp.	Locality.	From whom received.	Remarks.
9303	3	Clear Lake, Cal.	G. W. Tryon, Jr.	Fig. 20.

Spurious Species.

Valvata arenifera, Lea, Tr. Am. Phil. Soc. IV, 104, pl. xv, f. 36; Obs. I, p. 114. On p. 27 of Vol. V it is said to be the larva case of *Phryganea*. Vide the interesting remarks by Von Siebold on this and similar sacs of Phryganidous and other insects in a paper "On a true Parthenogenesis in Moths, &c.," translated by Dallas, London, 1857, p. 28, note. See also Conrad, N. Fr. Water Sh. p. 2.

Valvata cinerea, Say, from Western States, is mentioned by name only by Wheatley in his Cat. of Shells of U. S., p. 29; also—

Valvata buccata, Lea, Schuylkill.

Valvata lustrica, Menke, Syn. Meth. Moll. (Zeit. f. M. II, 130.)

Fossil Species.

Valvata parvula, Mk. and Hdn., Phil. Pr. 1856, 123.

Valvata scabrida, Mk. and Hdn., Phil. Pr. 1860, 418.

Valvata subumbilicata, Mk. and Hdn. Phil. Pr. 1860, 430.

Planorbis subumbilicatus, Mk. and Hdn. (1856, 120).

[1] Eastern North American?

[2] The specimen figured was received from Mr. Tryon.

Family VIVIPARIDÆ.

Lingual membrane with seven series of teeth (3, 1, 3), the central teeth broader; simple or denticulated at their apices.

Fig. 22.

Lingual dentition of *Vivipara subpurpurea* (Stimpson).

Rostrum simple, moderate; tentacles short, stout, the right hand one, on the male, as large as the rostrum; eyes on peduncles at their exterior base. Foot large, simple. Operculum annular, sometimes with a spiral nucleus. Shell spiral, turbinate, covered with an olivaceous epidermis; aperture simple in front.

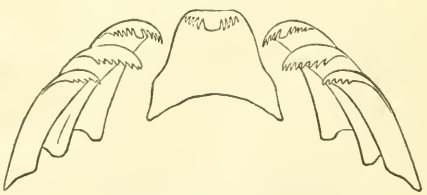
VIVIPARA, Lamarck.

Foot of moderate size, thick, not produced beyond the snout. Colors very dark. Head rather large. Snout of moderate

Fig. 23.

Animal of *V. intertexta*. (Male.)

Fig. 24.



Lingual dentition of *V. intertexta*.

size. Lingual teeth armed with large denticles at their cusps; the central tooth with from seven (*swainsonii*) to eighteen (*sub-*

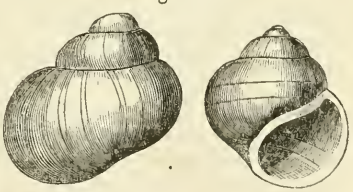
purpurea) denticles, the intermediate with from seven to twelve, the inner lateral with from five (*swainsonii*) to ten (*georgiana*), and the outer lateral with from five (*subpurpurea*) to sixteen (*bengalensis*). Right tentacle as broad as the snout, and but little shorter than the left, with its extremity truncated and excavated, forming a sheath for the reception of the connate male organ, which projects a little beyond when unsheathed or unfolded. Cervical lappets of each side very large, and folded, trough-shaped, forming with the mantle distinct tubular conduits, on the right side for the ingress, and on the left for the egress, of the water for respiration. Branchial laminæ very numerous, narrow, almost linear, and crowded in a single row, but variable in width at base, and diverging at their tips so as to appear to be in three or more rows. (*Stimpson.*) Operculum with the nucleus simple. Shell thin, turbinated, sometimes umbilicated; spire produced, whirls round, smooth or carinated, covered with an olivaceous epidermis; peristome thin, continuous, simple anteriorly.

Fig. 25.

Operculum of *V. georgiana.*

Vivipara intertexta, Say.—Shell subglobose, yellowish-green or brownish, wrinkled, and with minute, very numerous, obsolete revolving, deciduous lines; spire depressed conic, obtuse, truncated, eroded at tip; volutions nearly four; suture rather deeply indented; umbilicus closed by the lateral extension of the columella.

Fig. 26.



Paludina intertexta.

Greatest breadth, from four-fifths to one inch; length, about the same. Inhabits Louisiana.

We collected many of the shells in the marshes near New Orleans and on the banks of the Carondelet canal. It is remarkable for its globular form and for the numerous obsolete lines which seem like equidistant deciduous corrugations of the epidermis, having no effect whatever in modifying the calcareous surface, upon which it exhibits no trace. In good specimens two or three obsolete, pale bands are visible by transmitted light. (*Say.*)

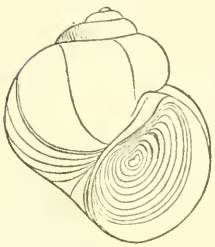
Paludina intertexta, Say, 1829, New Harmony Diss. II, 244; Am. Conch. 3, pl. xxx, f. 3, 4, 1831; Binney's ed. p. 146, 185, pl. xxx, f. 3, 4; ed. Chenu, 42, pl. xi, f. 7—9.—Haldeman, Mon. p. 31, pl. x, f. 1—6, 1841.—DeKay, N. Y. Moll. p. 85 (1843).—Philippi, Conch. II, 8, pl. ii, f. 4 (1846).—Küster, in Chemn. ed. 2, p. 16, pl. iii, f. 9, 10* (1852).

Paludina transversa, Say, N. H. Diss. II, 245, 1829; Binney's ed. p. 145. —DeKay, N. Y. Moll. p. 85 (1843).

Ampullaria (?) *intertexta*, Haldeman, Mon. Ampullaria, p. 11 (1844?).

In addition to Mr. Say's localities, I have received it from Grand Coteau, St. Laundry Parish, La. (*Blanc.*) Also from South Carolina (*Ravenel*), and from Davenport, Iowa (*Prof. Sheldon*). Very globose specimens of *Vivipara contectoides* sometimes are readily confounded at first glance with this species. They are umbilicated.

Fig. 27.



Vivipara intertexta.

Mr. Say's figures are copied above (fig. 26). Fig. 27 represents the front view of a more perfect specimen, No. 8863 of the collection.

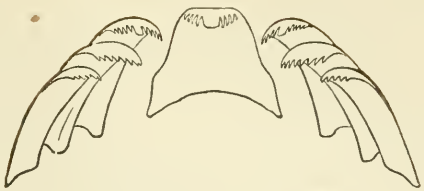
Mr. Say's type of *Pal. transversa* is still preserved in the Cabinet of the Philadelphia Academy. It is evidently a young *intertexta*, as suggested by Haldeman. His description follows, with a view of his type (Fig. 28).

Paludina transversa, Say.—Shell transverse, depressed, orbicular; spire convex; whirls three and a half, with numerous minute, slightly elevated revolving lines; suture not widely indented; body whirl very convex, short; umbilicus small; operculum pale fulvous. Greatest width, two-fifths of an inch. Inhabits Louisiana. We obtained two specimens in the marshes near New Orleans. It is much wider in proportion to the length than any other species I have seen, exceeding in this respect even *M. subglobosa*, nob., and especially *P. intertexta*, nob., of which latter, in fact, I at first supposed it to be the young, in consequence of its rotundity and the similarity of its capillary lines: but inasmuch as the number of its whirls is nearly the same, whilst the magnitude differs so greatly, I have separated it as a different species. (*Say.*)

Fig. 28.

Paludina transversa.

Fig. 29.

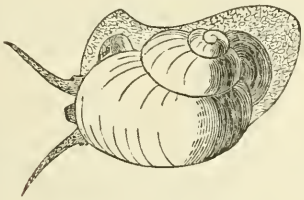


Lingual dentition of *V. intertexta.*

Fig. 29 represents the lingual dentition of *V. intertexta.* There are forty-eight rows of seven teeth each, the first fifteen or sixteen of a smoky claret color.

The male and female of this species are respectively represented in Figs. 31 and 30.

Fig. 30.



Female of *V. intertexta.*

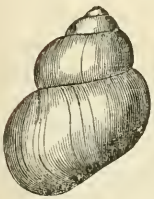
Fig. 31.

Male of *V. intertexta.*

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8862	4	Grand Coteau, St. Laundry, La.	Rev. A. Blanc.	.....
8863	2	Grand Coteau, St. Laundry, La.	"	Figured.
8864	2	New Orleans.	Acad. Nat. Sc.	.....
9202	2	Illinois?	Gen. Totten.	.....
9305	..	Iowa—Davenport.	Prof. Sheldon.	Lingual ribbon—Fig. [29.
9315	1	" "	"	Female.
9316	1	" "	"	Male.

Vivipara subpurpurea, Say.—Shell oblong, subovate, olivaceous, with a tinge of purple more or less intense, sometimes hardly perceptible; spire rather obtuse, terminating convexly; whirls five, wrinkled, equally convex; suture impressed, but not very profoundly; aperture much widest in the middle, narrower above; within glaucous, somewhat perlaceous; labrum rectilinear from the middle upwards; umbilicus none. Length about one inch, greatest breadth four-fifths of an inch.

Fig. 32.



Pal. subpurpurea.

An inhabitant of Fox River, an arm of the Wabash. It is very distinct from any other species I have seen.

The labrum exhibits no curvature from the middle almost to its junction with the penultimate volution.

Shell subglobular oval, not remarkably thickened; spire longer than the aperture, entire at the tip; whirls five, slightly wrinkled across, rounded but not very convex; penultimate volution somewhat elongated; suture impressed; aperture ovate-orbicular, less than half the length of the shell; labium with calcareous deposit; animal very pale bluish, with minute yellow points, particularly on the rostrum, tentacula, and prominent respiratory tube, which is as long as the tentacula; eyes on the exterior side of the tentacula, near the middle of their length; the anterior portion of the foot is very short.

Fig. 33.

Vivipara subpurpurea, young.

This species was first found by Mr. Lesueur and Dr. Troost, in Fox River of the Wabash. In the young state the figure is subglobose, and the aperture, although it hardly differs in form from that of the adult, is yet longer than the spire. They become proportionally more elongated as they advance in age, and the form, therefore, of the adult, is so different from that of the young or half grown, that in these states it may, very readily, be mistaken for a widely distinct species.

The color of the shell is variable. In some it is pale horn, more tinged with yellowish than with green; in others are traces of obsolete purplish bands; in many specimens the whole shell is reddish-purple, more or less obscure in different individuals.

Fig. 34.

V. subpurpurea, young.

In the autumn it is frequently found between the valves of dead Unios, in which it enters perhaps to hybernate. The species is certainly allied to the *viripara*, but it cannot well be mistaken for it, as it is much less dilated, the volutions less convex; the penultimate volution is much longer in proportion to the length of the body whirl, and the umbilicus is obsolete. (*Say.*)

Paludina subpurpurea, Say, 1829; N. H. Diss. II, 245; Am. Conch. III, pl. xxx, f. 2, 1831; Binney's ed. p. 146, 185, pl. xxx, f. 2; ed. Chenu, 41, pl. xi, f. 6 —Haldeman, Mon. p. 28, pl. ix, 1841.—DeKay, N. Y. Moll. p. 86 (1843).—Küster, Chemn. ed. 2, p. 12, pl. ii, fig. 10–13; pl. vii, fig. 3–5.—Reeve, Con. Icon. 47, Feb. 1863.

Vivipara texana, Tryon, Pr. Ac. Nat. Sc. (fig.), Sept. 1862, p. 451.—Reeve, Con. Icon. 24 (Feb. 1863).

Mr. Say's original specimens of this species are still preserved in the collection of the Philadelphia Academy. Fig. 35 is taken from one of them.

The surface is often quite smooth and shining, the spire more or less elongated and slender, but generally distinguished by the penultimate whirl, which is very much larger than is usual in our

Viviparæ, and when seen from behind, appears remarkably bulging at its upper portion. The umbilicus is not always closed. Fig. 32 is copied from one of Mr. Say's figures. No. 9301 of the collection is figured in Fig. 36.

Fig. 35.

Vivipara subpurpurea.

In the description of the animal Mr. Say speaks of a tubular cylindrical organ as a respiratory syphon, but Haldeman suggests its being probably the outlet of the viscous glands.

A specimen in Mr. Anthony's cabinet measures in extreme length 33, last whirl 19, penultimate 8, antepenultimate 2½ mill., the measurements being taken on the front of the shell.

I have traced this species from Texas through Louisiana and Mississippi to Key West, Florida, and in the Western States of Indiana, Wisconsin, and Missouri.

Fig. 36.

Vivipara subpurpurea.

A more elongated, slender form of the species, which is common in the southwest, from Mississippi to Texas, has been described by Mr. Tryon as a distinct species under the name of *V. texana.* A careful examination of the specimen from which his diagnosis is drawn, as well as the large series in the Smithsonian collection, leaves no doubt in my mind of its identity. The original description and figure are given below. Reeve figures a much less characterized specimen of *V. subpurpurea* as *Pal. texana,* which he considers distinct.

Vivipara texana.—Shell solid, conic, light green colored; spire elongate, suture deeply impressed, apex obtuse; whirls 6, slightly convex; aperture small, suborbicular, equalling two-fifths the shell's length.

Fig. 37

Vivipara texana.

Texas. Coll. Acad. Nat. Sciences; Coll. G. W. Tryon, Jr.

Shell solid, narrowly conic, consisting of six whirls, which are somewhat flattened around the upper half of their breadth; suture well marked; aperture suborbicular, equalling two-fifths of the length of the shell; umbilicus covered; epidermis light green with faint red revolving bands.

This shell resembles most the *V. subpurpurea*, Say, but

is easily distinguished by having six whirls, which are much narrower than in that species. The spire is also almost double the length of that of *subpurpurea*, and the epidermis of a lighter color. (*Tryon.*)

Fig. 38.

Operculum of *V. subpurpurea.*

Operculum horny, rounded; nucleus subcentral; lines of accretion concentric.

The lingual dentition of *V. subpurpurea* is shown in Fig. 39.

Fig. 39.

Lingual dentition of *Vivipara subpurpurea.* (STIMPSON.)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8844	9	Natchez.	Col. Wailes.	.....
8845	13	Lake Concordia.	"	.....
8846	8	Mississippi River.	.....	.....
8847	4	.....	.....	Cabinet series.
9210	1	.....	.....	.....
9301	1	.....	W. G. Binney.	Fig. 36.
9314	2	.....	Agassiz.	Figured.

Vivipara multicarinata, HALD.—Shell conic, thin, subdiaphanous, green, whirls 5, longitudinally striate and transversely carinate.

Fig. 40.

Paludina carinata.

This *Paludina* is thinner and lighter than our species, and has but 5 whirls. The length is about one-fifth more than that of the last whirl, of which the diameter is about double that of the penultimate whirl; beside the longitudinal striæ, there are four carinas, of which the first and third are stronger than the second and fourth, and which cover the whole length of each of the whirls.

The opening is almost circular, yet the vertical is greater than the transverse diameter. The lip is slightly thickened, not acute; the columella, which is hardly distinct from the lip, joins the superior termination of the aperture under a slightly acute angle.

The columella termination of the lip partially covers a very small umbilicus. The length of fully developed shell is 14, its-breadth 11 lines. (*Valenciennes.*)

Paludina carinata, Valenciennes, in Humboldt and Bonpland (1833), Rec. d'Obs. II, 252, pl. lvi, f. 2, *a b*.—Küster, in Chemn. ed. 2, p. 28, pl. vi, f. 6, 7.—Haldeman, Mon. p. 27, pl. viii (1841).
Paludina multicarinata, Haldeman, Mon. pt. 4, p. 4 of cover (1842).

Figure 40 is a fac-simile of that of Valenciennes, whose description is copied above. Prof. Haldeman suggests the name *multicarinata*, as the name *carinata* has also been used by Swainson. I have seen no specimen of the species.

Vivipara contectoides.—Shell umbilicated, elongately-ovate, rather thin, smooth, shining, the surface scarcely broken by the extremely delicate lines of growth; greenish horn-color, sometimes darker, varied with several longitudinal dark streaks marking the former peristome, and with four well marked brown bands revolving upon the body whirl, of which two only are visible on the penultimate and antepenultimate; under the epidermis of a pale yellowish color, still plainly showing the bands; spire scalariformly turbinated, apex entire, well defined, obtuse; whirls 5, bulging, regularly and rapidly increasing in length, the last ventricose, more than one-half the shell's length, umbilicated; aperture sub-circular, oblique, about half as long as the body whirl, within white, showing plainly the four revolving bands, the lower one very near its base, none of them reaching the edge of the aperture; peristome dark, thin, acute, made continuous by the dark, thin, exserted callus which connects the terminations, somewhat reflected at the umbilicus.

Fig. 41.

Vivipara contectoides.

Fig. 42.

Operculum of *Vivipara contectoides.*

Length of axis 22, greatest breadth of last whirl 18; length of aperture 15, breadth 13 mill.

Operculum horny, concentric, thin, flexible, concave, the nucleus nearer the columellar margin (Fig. 42).

Limnæa vivipara, Say, Nich. Enc. Am. ed. [1], pl. ii, f. 5 (1817) (*Paludina* of later ed.).
Paludina vivipara, Say, Am. Conch. pl. x, outer figs. (1830); Binney's ed. 49, 159, pl. lxx, f. 5; ed. Chenu, 17, pl. ii, f. 5, 5*a*.—Haldeman Mon. 17, pl. vi (1841).—DeKay, N. Y. Moll. 86 (1843).

Paludina linearis, Küster, in Ch. ed. 2, 10, pl. ii, f. 6–9; p. 19, pl. iv, f. 4 (1852).

Helix vivipara, Eaton, Zool. Text-Book, 196 (1826).

Has been found in Florida, Georgia, South Carolina, Alabama, Arkansas, Missouri, Illinois, Indiana, Michigan.

The specimen (Fig. 41) from which the above description is drawn is probably a male. It is the most scalariform of all that I have seen. The species is variable, the degrees of globoseness being numerous.

Fig. 43.

Vivipara contectoides, young.

Fig. 44.

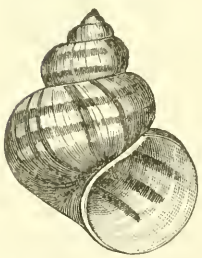
Vivipara contectoides, young.

The umbilicus is rarely entirely closed, even in young shells.

The number and disposition of bands is constant in all the specimens before me; the lower band sometimes is expanded so as to surround and enter the umbilicus.

The species is readily distinguished from *V. georgiana* by its perfect apex, by the greater globoseness of its whirls—they being more loosely convoluted, and by its more shining surface. Its epidermis is more delicate, and does not peel off like that of *georgiana*.

Fig. 45.



Vivipara contecta, Mill.

Fig. 46.

Vivipara vivipara, Lin.

Vivipara contectoides receives its name from its strong resemblance to the *V. contecta* of Europe. It has been by some authors considered identical with that species, and with the exception that the American form has four spiral bands upon the body whirl while the European is described as having but three, I can detect no specific differences between them. It is more upon its geographical distribution that I base my opinion of its being distinct. Our species is found over an area very much vaster than that inhabited by its European analogue. It is not one of the fluviatile species of the circumpolar or boreal regions, common to the three continents, as it is not found farther north than the great lakes. I am inclined to believe that, as with the exception of these circumpolar species the land and fresh-water

molluscous fauna of Europe and America are entirely distinct, we are justified in considering that this *Vivipara* is not identical with the *V. contecta.*

There exist in Europe two species of *Vivipara:* the *contecta* (*Cyclostoma*), Millet, and *vivipara* (*Helix*), Lin. It is to the former that our species bears so strong a resemblance, and not to the *vivipara,* as suggested by authors. I have copied Reeves' figures of both species (Figs. 45 and 46) that those not having access to foreign works may compare them with our shells. *V. contecta* is described as being composed of $5\frac{1}{2}$ prominently turned whirls, convoluted so loosely as to leave a deep umbilicus in the centre; while *V. vivipara* has one whirl less, has moderately ventricose whirls, and is more constrictedly convoluted—the umbilicus being reduced to a mere chink.

I have elsewhere remarked that *V. contectoides* seems, in respect to form, to hold the same relation to *V. georgiana* as *V. contecta* does to *V. vivipara.*

I have been unable to obtain living specimens of this species, or any preserved in spirits, from which to examine the lingual membrane.

Mr. Say first mentions this species as early as 1817, describing it as identical with the European *V. vivipara,* as a *Limnæa,* and later as a *Paludina.* I give below a copy of his description and figures from the American edition of Nicholson's Encyclopedia (Fig. 47), and the American Conchology (Fig. 48). It will be observed that Say mentions three revolving bands instead of four. I am inclined to attribute this to his overlooking the lowest band, which is quite at the base of the shell and does not extend so far towards the edge of the aperture on the inside.

Paludina vivipara, Say. — Shell subconic, with six rounded whirls; suture impressed, color olivaceous or pale, with three red-brown bands, of which the middle one is generally smallest, whirls of the spire with but two; aperture suborbicular, more than half the length of the shell.

It is doubtful whether or not this is the same as the *vivipara,* but it certainly approaches very near to it; we, however, refer it to that species until a specific difference can be indicated, which at present we are unable to do; the spire of this species is rather more obtuse, and the suture not so deeply impressed, as in the figures of the European specimens above mentioned. 14

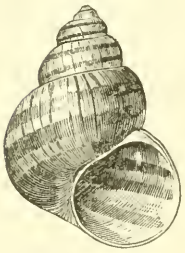
Fig. 47.

Paludina vivipara.

Donov. Brit. Shells, tab. lxxxvii, *Helix vivipara*.—Lister, Conch. tab. cxxvi, fig. 26; *Cochlea vivipara fasciata*, &c. &c.

This appears to be one of the many species that are common to North America and Europe. And though the specimens from the two continents differ a little, yet this difference is so slight as not to be specific. Cuvier remarks that "the female produces living young, which are found in its oviducts, in the spring, in every state of development. Spallanzani assures us, that the young, taken at the moment of their birth and nourished separately, reproduce without fecundation, like those of the *Aphis*. The males are nearly as common as the females; their generative organ is exserted and retracted, as in *Helix*, by a hole pierced in the right tentaculum, which causes this tentaculum to appear larger than the other. By this character the male is easily known."

Fig. 48.



Paludina vivipara.

The *vivipara* is far less common than the *decisa*, and seems to be more usually found in the southern part of the Union. Mr. Elliott of Charleston sent me two specimens from the banks of St. John's River, Florida, and Capt. Leconte presented me with one, which he obtained at Lake George on the same river. Pl. 10,[1] the two middle figures exhibit the brownish banded var. (*Say.*)

The next notice of the species was by Eaton, in 1826, who describes it as *Helix vivipara.*

In 1841 it is again described and figured by Haldeman, as identical with the European *Paludina vivipara.* The bands are spoken of as "several." Prof. Haldeman quotes *Pal. lineata* in the synonymy. (See that species).

The description of DeKay (1843) gives no additional information regarding the species, which is "extra-limital" to New York; it gives only four whirls and three bands to the shell.

In 1852, in the second edition of Chemnitz, this species is described and figured as *Paludina linearis.*

In the Proceedings of the Philadelphia Academy, 1862, p. 451, Mr. Tryon points out the fact of the American shell being invariably distinguished by the presence of four bands, yet refers it to *Pal. lineata*, Val., which derives its name from its being sometimes characterized by numerous revolving lines of green color instead of bands.

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[1] One of the figures is given in my figure 48.

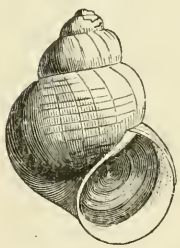
In 1863 Mr. Reeve refers the American form to *Paludina vivipara*, Lin.

Believing the species to be distinct from its European analogue, and not finding the description of Valenciennes to apply to it, I have been forced to adopt a new name, suggested by the resemblance of the shell to the *V. contecta* of Europe.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8849	1	Coosa River, Ala.	Dr. E. R. Showalter.	.....
8850	3	Lake Muxinkawka, Ind.	.....	.....
8851	4	Jacksonville, Fla.	W. G. Binney.	.....
8852	4	Georgia.	J. Postell.	Cabinet series.
8855	2	Illinois.	.....	.....
8856	2	Mississippi River.	.....	.....
8860	3	Indiana.	W. G. Binney.	.....
8861	4	St. Clair River.	.....	.....
9011	1	.....	.....	.....
	1	Florida.	Prof. Agassiz.	.....
9202	1	Tuscumbia, Ala.	Gen. Totten.	.....

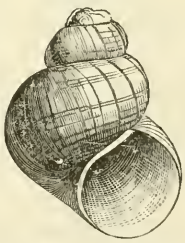
Vivipara georgiana, Lea.—Shell scarcely rimate, elongately ovate, rather thick, smooth, lines of growth delicate; greenish horn-color, broken with darker longitudinal streaks and a few black ones showing the former peristomes, and whitish under the epidermis; sometimes of a rich brown color, pinkish without the epidermis, and varied with four revolving darker bands upon the body whirl, two of which only are visible above, and numerous irregularly crowded, narrow lines of the same color; spire elevated, composed of one entire and one partially truncated whirl, apex entirely removed; remaining whirls 4½, regularly increasing, convex, the last bulging, more than one-half the shell's length, rarely rimate; aperture subcircular, very oblique, more than half the length of the body whirl, within uniformly white or dark horn-color, or plainly showing the revolving bands, which do not reach the edge; peristome edged with black, simple, acute, continuous, its columellar margin exserted, somewhat reflexed, leaving a narrow fissure, connected with the upper termination by a shining, dark, raised callus. Length of axis 20, greatest breadth of body whirl 21; length of aperture 15, breadth 14 mill.

Fig. 49.



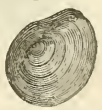
Vivipara georgiana.

Fig. 50.



Vivipara georgiana.

Fig. 51.



Operculum of *V. georgiana.*

The operculum is thin, horny, brown, concentric with sub-central nucleus.

Paludina georgiana, Lea, Tr. Am. Phil. Soc. V, 116, pl. xix, fig. 85, date of title 1837; Obs. I, p. 228.—Haldeman, Mon. p. 23, pl. vii, f. 1, 2 (1841).—Küster, in Chemn. ed. 2, p. 15, pl. iii, f. 7, 8 (1852) —DeKay, N. Y. Moll. p. 86 (1843).—Chenu, Man. Conch. I, 310, fig. 2207 (Melantho); Illust. Conch. pl. i, f. 20, 21.—Philippi, Conch. iii, 4, pl. i, f. 13 (1848).

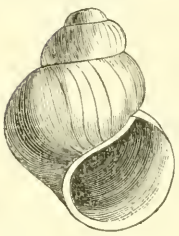
Paludina wareana, Shuttleworth in Küster, Chemn. ed. 2, 21, pl. iv, f. 10–11.—Reeve, Con. Icon. 23 (1863).

Vivipara vivipara (part), W. G. Binney, proof-sheets of this work.

Inhabits Florida, Georgia, South Carolina, and Alabama.

Mr. Lea's description of this species will have to be considerably modified to cover the various forms now known to exist; it was drawn from a specimen which was uniformly dark, horn-colored. Specimens in the Smithsonian collection are thus characterized, while others are of an uniform pale greenish horn-color; others (Fig. 53) have a dark-green or brownish ground, varied with four broad brownish bands revolving on the body whirl, two only of which are discernible on the penultimate whirl; in others these bands are replaced by numerous revolving, unequal brown lines (Fig. 54). Those having the revolving lines have also bands which, as in the other cases, are plainly visible in the aperture of the shell. The bands do not reach the edge of the peritreme in the aperture; they are still discernible when the shell has lost its epidermis. As the peritreme rises to meet the base of the body whirl it is expanded and reflected, sometimes leaving a chink forming a false umbilicus—the shell being imperforate.

Fig. 52.



Paludina georgiana.

Fig. 53.

Vivipara georgiana.

I have not been able to trace any revolving microscopic lines upon the specimens I have examined.

No. 8854 of the collection was determined by Mr. Lea. His description is given below, and an outline of his original figure. Fig. 52 is copied from Haldeman's figure, which was drawn from the original specimen. The other figures are from specimens in the collection.

Fig. 54.

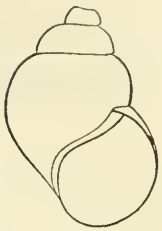
Vivipara georgiana.

Paludina georgiana, Lea.—Shell ventricose-conical, thin, dark horn-colored, smooth; sutures very much impressed; whirls about five; convex; aperture nearly round, white.

Hopeton, near Darien, Ga. Prof. Shepard; my cabinet; cabinet of Prof. Shepard. Diameter .7, length 1.1 inch.

This species in form resembles most, perhaps, the *P. vivipara*. It is not quite so large, nor has it bands. It is rather more elevated, and the body whirl is smaller and rounder than the *P. decisa*, Say. The aperture at the base recedes more than is usual with the genus. (*Lea.*)

Fig. 55.



Paludina georgiana.

Vivipara georgiana is not a variable species in form. It bears somewhat the same relations to *V. contectoides*, as the European *V. vivipara* does to *V. contecta*. It is more constrictedly coiled upon its axis, its spire is more pyramidal in shape, its whirls are more flattened, and less angularly bulging at their upper portion. It is constantly truncated at the apex.

Reeve places *Pal. georgiana*, together with *vivipara*, Say, in the synonymy of the European *vivipara*, as I did in the proof-sheets of this work. The specimens since received have caused me to change my opinion.

An examination of an authentic specimen of *Pal. wareana* leaves no doubt in my mind of its identity with *V. georgiana*. The original description and a fac-simile of one of the original figures here follow :—

Paludina wareana.—Shell rimately perforate, ventricose, rather thin, subopaque, with delicate concentric lines, olivaceous-ferruginous, thickly streaked with smoke color; whirls 4, inflated, sutures deep; aperture oval, white, ends joined by a thin, glassy callus; peristome straight, sharp.

Fig. 56.

Paludina wareana.

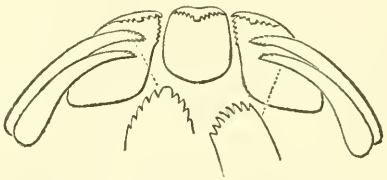
Shell somewhat resembling *Pal. obtusa*, but is very truncated, rimate, perforate, ventricose, rather thin and transparent, almost opaque; striæ fine; color olive green blending with iron; surface broken by numerous curved streaks, sometimes linear, sometimes stronger; whirls 4, slightly increasing; first whirl entirely eroded, the second slightly so in the shell examined; whirls ventricose, sutures moderate; aperture ovate, much shorter than the spire, above modified by the penultimate whirl, reddish within, bluish towards the edge; parietal wall covered with a thin transparent callus; columellar slightly curved; peristome straight,

acute, from below the middle to the base slightly curved. Length 9‴, breadth 7‴.

East Florida, in Lake Ware (Rugel). Coll. Charpentier (*Shuttleworth*).

The lingual membrane of *Vivipara georgiana* is figured below.

Fig. 57.



Lingual membrane of *Vivipara georgiana*. [STIMPSON.]

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8853	1	Georgia.	.....	.....
8854	3	"	.....	.....
8857	1	Alabama.	Acad. Nat. Sc.	.....
8958	2	Darien, Geo.	"	.....
8959	1	South Carolina.	"	.....
9012	1	.....	.....	Figured.
9022	1	Florida.	.....	"
9023	1	Georgia.	.....	"
9300	1	Florida.	L. Agassiz.	" [Figured.
9304	..	.....	"	Lingual of 9300.

Vivipara lineata, VALENCIENNES—This species resembles that of the Seine. It is equally ventricose, but has a thinner shell. Shell ventricose-ovate, thin, diaphanous, with delicate transverse striæ; greenish horn-color, with numerous transverse greener vittæ. Whirls five, last one large, ventricose, and equalling in height one-half the entire length of the shell. Besides the striæ of growth, there are numerous transverse, very fine lines. The whirls are not flattened towards the moderate suture. Apex acute. Color green, sometimes somewhat corneous ground, on which are a large number of bands of a deeper green and variable width, sometimes merely linear. On the upper whirls the bands are obsolete. Apex not eroded in any of a large number of individuals.

Operculum brown, thin, horny, covered with numerous concentric, not spiral, lines. Found in Lake Erie by M. A. Michaud, who found one shell full of young, as in the case of our species, which proves the species to be viviparous. There is reason to believe the other species also are so, though in the most natural genera species vary in being both oviparous and viviparous. The genera of colubers and vipers among the reptiles are an example of this, while the Mollusca furnish more numerous ones.

Length 1 inch 3 lines. (*Valenciennes.*)

Paludina lineata, Valenciennes, Rec. d'Obs. II, 256, 1833.

I have translated above the original description of Valenciennes. I have never seen any specimen to which it will apply, but have no doubt such will be found. At present it remains a doubtful species.

It is referred to *Pal. vivipara*, of Say, by several authors, but all the specimens of that species which I have seen are not characterized as *V. lineata* is described as being. (See remarks under *V. contectoides.*)

Vivipara troostiana, Lea—Shell ventricose-conical, thin, pellucid, yellowish horn-color, smooth, perforate; spire short; sutures very much impressed; whirls four, convex; aperture large, rounded, white.

Tennessee. Prof. Troost. My cabinet, and cabinet of Prof. Troost. Diam. .68, length .72 inch.

This is a subglobose species, differing from any which has come under my notice, in having the superior portion of the last whirl somewhat flattened, giving the shell a somewhat gibbous appearance. The operculum is rather of a light color, and the plane of the aperture is very retuse at its base. It has a strong resemblance to *P. unicolor* (Lamarck), and perhaps a stronger one to *P. Maheyana* (Grateloup). It is more depressed in the spire than either, and the perforation is smaller than in the former, while it is nearly the size of that in the latter. The aperture is larger than either. Dr. Grateloup has very properly, I think, separated the Malabar species from that which was observed by Olivier in Egypt, and called *unicolor* by Lamarck. The Egyptian shell has a larger perforation, is darker in color, and is a larger species. I call this after my friend Prof. Troost. (*Lea.*)

Fig. 58.

Vivipara troostiana.

Paludina troostiana, Lea, Tr. Am. Phil. Soc. IX, 14 (1844). Obs. IV, p. 14. Proc. II, 34 (1841). Arch. f. Nat. 1843, II, 130.

Paludina haleiana, Lea, l. c. X, 96, pl. ix, f. 58 (1847). Obs. IV, 70. Proc. IV, 167 (1845).

I have added to Mr. Lea's description of *V. troostiana* a view of the type (Fig. 58) in his collection. It will not seem to correspond very exactly with the figure of *haleiana*, of which a fac-simile is given below (fig. 59). A comparison of all of Mr. Lea's specimens of each has convinced me, however, of their identity. Mr. Lea's description of the latter species here follows.

Fig. 59.

Paludina haleiana.

Paludina haleiana, Lea—Shell smooth, ventricosely conical, rather thin, reddish horn-color, imperforate; spire short; sutures much impressed; whirls four, nearly convex; aperture large, nearly round, bluish.

Diameter .4, length .55 inch. Alexandria, La.

This species is nearly allied to the *Pal. troostiana*, nob., but is rather smaller, of a darker color, not quite so rotund, and imperforate. These differences would distinguish it without difficulty. In the *haleiana* there is a disposition in most of the specimens to a compression below the sutures. This makes quite a shoulder at the sutures and prevents the mouth from being regular. (*Lea.*)

Vivipara coosaensis, Lea—Shell subglobose, thin, pale, rather smooth, perforate; spire short; sutures very much impressed; whirls five, round; aperture large, nearly round, within whitish.

Fig. 60.

Vivipara coosaensis.

Coosa River, Alabama. Dr. Brumby. My cabinet, and cabinets of Dr. Griffith and Dr. Foreman. Diam. .58, length .62 inch.

This species is remarkable for its round whirls, its width and large deep sutures. The superior part of the whirls is somewhat flattened. The color is remarkably pale, nearly white. The epidermis is very thin, and under the lens displays very minute, rather regular longitudinal striæ crossed on the body whirl by obsolete striæ. The aperture is nearly one-half the length of the shell. (*Lea.*)

Paludina coosaensis, Lea, Tr. Am. Phil. Soc., IX, p. 23 (1844). Obs. IV, 23. Proc., II, 83 (1841).—Reeve, Con. Icon. (Feb. 1863).

Paludina magnifica, pars., Haldeman, Mon., pt. 6, p. 4 of wrapper.

Mr. Lea's type of this species bears but little resemblance to *V. magnifica*, yet Prof. Haldeman unites the two. I myself have seen no connecting links between them, though I have examined numerous young individuals of *Viv. magnifica.*

Fig. 60 is drawn from the original specimen of Mr. Lea. No. 8949 of the Smithsonian collection was labelled by Mr. Lea.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8949	..	Alabama?	.....	Teste *Lea.* Cab. series.

TULOTOMA, Haldeman.

Soft parts of the animal, and lingual dentition unknown. Operculum with the nucleus simple. Shell thick, pointed-conic, imperforate; whirls flattened, nodulous, carinated, with a dark olivaceous epidermis; peristome thin, continuous.

Fig. 61.

Operculum of *Tulotoma magnifica.*

Tulotoma magnifica, Conrad—Shell subovate, ventricose, with two spiral bands of prominent tubercles on the body whirl, and one revolving near the base of each whirl of the spire; suture profoundly impressed, margined by an obtuse, subnodulous, prominent line; lines of growth very oblique and prominent; obscure spiral striæ; epidermis olive; within bluish, often with purple bands.

Fig. 62.

Paludina magnifica.

A beautiful species when perfect, occurring in vast abundance on the masses of calcareous rock, which have fallen from the strata above into the Alabama River at Claiborne. I found it living only in such situations, and exclusively within a range of six or eight miles. In the Tombeckbee or Black Warrior Rivers, I never observed a specimen of it, although I searched particularly for it on the rocks at St. Stephen's. (*Conrad.*)

Paludina magnifica, Conrad, N. Fr. W. Shells, 1834, p. 48, pl. viii, fig. 4; ed. Chenu, 23, pl. iv, f. 21.—DeKay, N. Y. Moll. (1843), p. 86.—Küster in Chemn., ed. 2, 1852, p. 23, pl. v, figs. 3-6.—Philippi, Conch., III, 1, pl. i, figs. 1, 2 (1848).—Müller, 1838, Syn. test. anno 1834, promulg. 39.—Reeve, Con. Icon. xx, f. 54 (1863).

Paludina bimonilifera, Lea; Tr. Am. Phil. Soc., V, 58, pl. xix, fig. 71, date of title, 1837.—Ib., Obs. I, 170.—DeKay, N. Y. Moll. 87 (1843).

Paludina angulata, Lea; Tr. Am. Phil. Soc., IX, 22 (1844).—Ib., Obs. IV, 22. Proc. II, 83 (1841).

Tulotoma, Haldeman, Mon. I, Suppl. 2.

Operculum horny, subtriangular, with a lateral nucleus and concentric striæ. A continuous elevated, heavy, revolving line sometimes takes the place of the nodules. The interior of the aperture varies from pure white to a rich dark purple; it is sometimes of a salmon color; the bands are also very variable in number and width. There are also sometimes dark-green

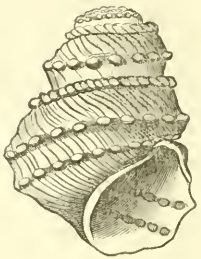
bands on the exterior of the shell. I have counted as many as four on the body whirl alone. It is variable in size, and is generally much eroded at the apex. One specimen which I measured was 50 mill. long.

Fig. 63.

Operculum of *Tulotoma magnifica.*

It inhabits Alabama and Georgia.

Fig. 64.



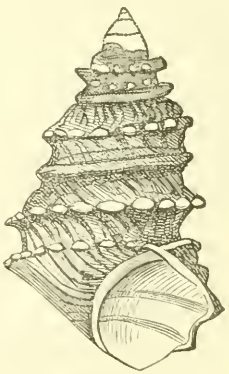
Tulotoma magnifica.

Fig. 62 is a fac-simile of the outline of Conrad's figure of *Paludina magnifica.* I have added below figures of Mr. Lea's *Pal. bimonilifera* and *Pal. angulata,* which are, I believe, identical with this species, Fig. 66 being a fac-simile of Mr. Lea's figure, and Fig. 67 being taken from a specimen determined by Mr. Lea. No. 8928 of the collection was labelled *Pal. angulata* by Mr. Lea. Haldeman agrees with me in considering this last identical with *T. magnifica.* I am indebted to Dr. E. R. Showalter for the other specimen figured. Haldeman adds *Pal. coosaensis* to the synonymy.

Fig. 65.

Tulotoma magnifica, young.

Fig. 66.



Paludina bimonilifera.

Paludina bimonilifera, LEA—Shell obtusely turreted, dark horn-color; apex obtuse; whirls furnished with two rows of nodules; the nodules of the lower row of the upper whirls hidden by the suture, those of the upper row larger, and visible on all the whirls; sutures deep and irregular; outer lip sub-biangular; base sub-angular.

Alabama River. (Judge Tait). My cabinet and those of Prof. Vanuxem, Am. Phil. Soc., Ac. Nat. Sc. Phila., P. H. Nicklin, Baron Ferussac. Diam. 1.1, length 1.8 inches.

This superb *Paludina,* which far surpasses in point of beauty any of our species yet known, I owe to the kindness of Judge Tait. Its beautiful double tuberculated cincture at once distinguishes it from all described species. Some specimens are furnished with dark purple bands which beautifully decorate the interior of the shell, and give a dark rich green color to its fine epidermis. In the others these are wanting, and the epidermis then has a clear and more yellow appearance. The sutures being

formed immediately over the lower row of tubercles, they cause its line to be very irregular; and this row itself is hidden on the upper whirls. (*Lea.*)

Paludina angulata, Lea — Shell inflated, thin, brown, above somewhat varicose, below transversely and minutely striate, minutely perforate; spire rather short, dark at the apex; sutures impressed; whirls five, angular in the middle; aperture large, subtriangular, within subrubiginous.

Fig. 67.

Paludina angulata.

Coosa River, Alabama. Dr. Brumby. My cabinet, and cabinets of Dr. Griffith, Dr. Jay, Dr. Foreman, T. G. Lea, and J. Clark. Diam. .80, length 1.05 inch.

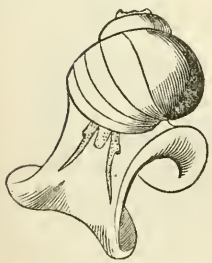
This is a very distinct species, being more angular than any I have seen. In the specimen before me, there are three irregular transverse impressions, two above the angle, and one immediately below. The striæ are more distinct on the lower half of the whirl. The first three whirls are very dark. The aperture is nearly one-half the length of the shell, and quite angular at the base.

Since the above was written, I have received more mature and perfect specimens. They differ from the one described in being darker in the epidermis, and in having four purple broad bands, which are very distinct within the aperture. In these specimens, there is a series of indistinct tubercles above the periphery of the last whirl. (*Lea.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8927	1	Alabama.	.....	Teste T. A. Conrad. Cabinet series.
9017	1	"	I. Lea.	(*P. angulata.*) Figured in Fig. 67.
8928	5	"	.....	*angulata* teste Lea.
9150	20+	Coosa River.	.....	..... [Cab. ser.
9196	2	Alabama River.	Dr. Showalter.	.....

MELANTHO, Bowditch.

Fig. 68.



Melantho decisa (female).

Foot large, rather thin, broad, much produced beyond the snout, and slightly auricled in front. Colors rather light, in reddish spots on a palish white ground. Head of moderate size. Snout small. Lingual teeth smooth, or only very mi-

Fig. 69.

Lingual dentition of *M. integra.*

nutely crenulated at their apices. Cervical lappets of moderate size, but not forming regular tubular aquiferous ducts; the right one plicated. Branchial lamina elongate-triangular, equal in size, and arranged in a single straight row both at base and tips. (*Stimpson.*) Operculum with the nucleus simple.

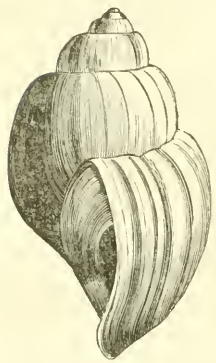
Fig. 70.

Operculum of *M. decisa.*

Shell thick, solid, ovate, imperforate, spire produced; whirls rounded, smooth, covered with an olivaceous epidermis; peristome simple, continuous.

Melantho ponderosa, Say—Shell imperforate, globosely-ovate, very thick and heavy, smooth surface hardly broken by the wrinkles and delicate striæ of growth, often also with delicate revolving striæ; greenish horn-color, with irregularly disposed dark streaks, marking the edges of former peristomes, milky white under the epidermis; spire short, conic, apex perfect, convex; whirls 5 or 6, very rapidly increasing in length, convex, the body whirl very large, equalling four-fifths the shell's length, imperforate; aperture oval, narrowed above, slightly oblique, equalling almost one-half the shell's length, within white, shining; peristome margined externally with darker color, simple, acute, extremely sinuous, in its first half rectilinear, then produced forward and rounded, then retreating rapidly and curving inwards and downwards, thence upwards to the base of the aperture, its columellar portion very much thickened, sometimes exserted sufficiently to leave a narrow fissure, connected with the upper terminus by a very thick and solid callus, which enters beyond sight within the aperture, and at the upper portion is produced into a prominent Lithasia-like thickening, between which and the peristome is a deep sinus. Length of the axis 33, greatest breadth of body whirl 27; length of aperture 28, greatest breadth 19 mill.

Fig. 71.



Melantho ponderosa.

Operculum elongate-ovate, narrow above, convex, margin thin, horny, concentric, nucleus near the columella.

Paludina ponderosa, Say, 1821, J. A. N. S. II, 173; Am. Conch. III, pl. xxx, f. 1 (1831); ed. Binney, p. 68, 184, pl. xxx, f. 1; ed. Chenu, 41, pl. xi, f. 5.—Haldeman, Mon. p. 13, pl. iv (1840).—De Kay, N. Y. Moll. p. 86 (1843) (exc. syn. *heterostropha*).—Deshayes in Lam. ed. 2, VIII, p. 516 (1838); ed. 3, III, p. 453, excl. *P. decisa.*—Küster in Chemnitz, ed. 2, p. 14, pl. iii, f. 1–4, p. 20, pl. iv, fig. 6.—

Sowerby, Gen. of Shells, f. 2.—Chenu, Man. de Concl. I. 310, fig. 2206 (Melantho); Illust. Conch. pl. i. f. 14–15; Lec. Elem. d'Hist. Nat. p. 171, f. 559, 560(1847).—Philippi, Conch. III, 3, pl. i, f. 6(1848).

Ampullaria crassa, Deshayes, Encycl. Méth. II, 32 (1830).

Paludina crassa, Say of Deshayes l. c.

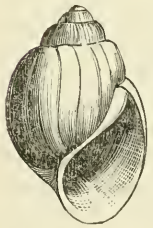
Paludina decisa (part), Reeve, Con. Icon. f. 45 *b*.

Paludina regularis, Lea, Tr. Amer. Phil. Soc. IX, 13 (1844); Obs. IV, 13; Proc. II, 34 (1841); Arch. f. Nat. II, 130 (1843).—Reeve, Con. Icon. pl. xi, f. 69 (1863).

I have received specimens from Ohio, Indiana, Illinois, Michigan near Lake Superior, Tennessee, and Alabama.

There are microscopic revolving lines upon the whirls of many specimens, and the callosity at the superior angle of the aperture is sometimes developed sufficiently to make quite a fissure between it and the lip, as in *Lithasia*. This is an important feature which serves to distinguish it from the allied species, as does also the highly developed curvature of the peristome (see Fig. 71), the extreme thickness of the shell, the heavy, deeply entering callus on the parietal wall of the aperture, the shorter spire, and more globose outline of the shell. It appears to me a distinct species, readily distinguished from *M. decisa* and *M. integra*, in early stages of growth as well as when mature—the young shells being very much more globose than the young of those species.

Fig. 72.



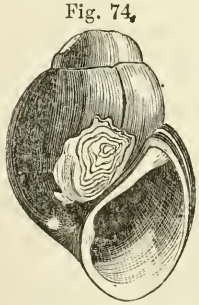
Melantho ponderosa, young.

Fig. 73.

Melantho ponderosa, young.

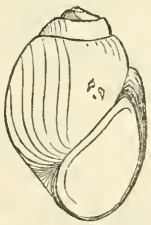
From the Coosa River, in Alabama, Dr. Showalter has sent numerous specimens of this species, which were formerly noticed by Prof. Haldeman as var. a. They are extremely solid. have the callosity of the upper portion of the aperture highly developed, are constantly truncated in the early as well as later stages of growth, and when mature are very much eroded even upon the body whirl. They have the usual features of *M. ponderosa*—

Fig. 74.



Melantho ponderosa.

Fig. 75.



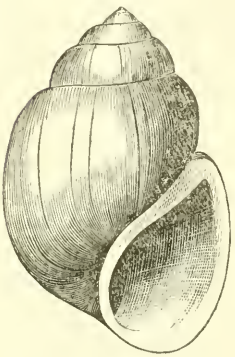
Melantho ponderosa.

the sinuous peritreme, the revolving striæ, the short spire, the heavy callus upon the parietal wall of the aperture. Some of them are figured in Fig. 72 to 75.

I give below the original description of Mr. Say, and a facsimile of one of his figures (Fig. 76). The shell figured as *Pal. decisa* in the American Conchology may, perhaps, be a form of *M. ponderosa*. (See Fig. 84.)

Paludina ponderosa, Say.—Shell somewhat ventricose, much thickened, olivaceous or blackish; spire not much elongated, much shorter than the aperture, eroded at tip, but not truncated; whirls five, slightly wrinkled across; suture profoundly impressed; aperture subovate, more than half the length of the shell; labium with much calcareous deposit, and thickened into a callosity at the superior angle; within tinged with blue.

Fig. 76.



Paludina ponderosa.

Inhabits Ohio River.

Greatest length, one inch and 11-20. Transverse diameter one inch and 1-10.

This shell is common at the falls of the Ohio, and is a very remarkably thick and ponderous species. It bears a striking resemblance to *P. decisa*, and has, without doubt, been generally considered as the same; but it differs from that species in being much more incrassated and heavy; and although much decorticated and eroded upon the spire, the tip is not truncated. In the labrum also is a distinctive character; by comparison this part will be perceived to be less arcuated in its superior limb than the corresponding part in *decisa*.

This shell is common in many parts of the Ohio as well as its tributaries. In its full grown state it is very thick and ponderous, enlarging so much in its body whirl, as to appear very different from the young shell. In the early stages of growth it resembles *P. decisa*, Nobis, from which indeed the back view would hardly distinguish it; but a sufficiently distinctive character resides in the lower part of the labium, which in the *decisa* is not obviously produced, whereas in the present species it is considerably advanced, as in many species of *Melania*, to which genus it is closely allied. (*Say.*)

I have no doubt that a young specimen of *Melantho ponderosa* is the type of *Paludina regularis*, Lea. My figure is drawn from a specimen determined by him, and now deposited in the collection of the Smithsonian Institution (No. 9016). The spire

is extremely short, flattened, but well defined quite to the acute apex; the sutures are impressed; the body whirl comprises more than five-sixths of the complete length of the shell; the aperture is almost as long as the body whirl, and so wide that the length and breadth of the shell are almost equal; the shell is remarkably globose, almost circular. I have often met in cabinets with immature specimens of *Viv. ponderosa* under this name. No. 8925 were also labelled *regularis* by Mr. Lea. His description here follows. The shell figured under this name by Reeve appears to me a young *M. ponderosa*.

Fig. 77.

Paludina regularis.

Paludina regularis, LEA.—Shell subglobose, rather thick, greenish horn color, imperforate; spire very short; sutures impressed; whirls five, convex; aperture large, ovate, within bluish.

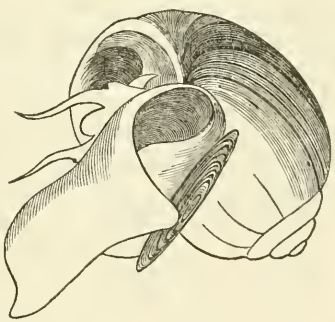
Ohio? T. G. Lea. My cabinet, and cabinet of T. G. Lea. Diam. .38, length .52 inch.

A very distinct species with the body whirl about four-fifths the length of the shell. The whirls are very regular, giving the spire somewhat the appearance of a coil of rope. All the specimens before me are more or less incrusted with the oxide of iron. The aperture is inflated, and about three-fourths the length of the shell.

I am not positively sure that this species came from Ohio. By some accident the label has been misplaced, but I am under the impression it came with some other species from my brother at Cincinnati. (*Lea.*)

Ampullaria crassa, of Deshayes, is a synonym of this species, as will be seen by the translation given below of Deshayes' description. He quotes erroneously *Paludina crassa*, of Say, for the species—Mr. Say never having published this name. An examination of the animal has, moreover, shown it to belong to the genus *Melantho*. Fig. 78 is taken from a drawing of the animal by Mrs. Say, which Prof. Haldeman furnished me.

Fig. 78.



Animal of *Melantho ponderosa*.

Ampullaria crassa.—Shell ovate-elongate, acute, thick, solid, under the epidermis brownish; very white; transversely substriate; whirls 6, con-

vex, scalariform, separated by a deep and channelled suture; aperture ovate acute, expanded at base, very white within, and with a small umbilicus.

Paludina crassa, SAY.

We do not agree with Mr. Say in placing this shell among the *Paludinæ:* it has not their essential characters, excepting the lengthening of the spire. In other respects it is more nearly allied to the *Ampullariæ*, its form and thickness particularly approaching some of the fossil species of the environs of Paris described below.

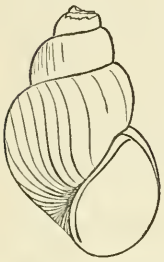
This shell is oval, elongated, acute at the summit, rounded at base, thick, solid, heavy, covered with a brownish, sometimes greenish very thin epidermis, below which the shell is of an uniform milky white pureness. The spire is elongated, conic, scalariform, formed by six convex whirls, deeply separated by a canaliculated suture, and, in perfect specimens, marked with delicate transverse striæ. The aperture is moderate, not oblique to the shell's axis or rounded or with a continuous peritreme like *Paludina*, but oval, narrowed above where it also is angular as in most *Ampullariæ*, enlarged below, where it forms a large, not deep sinus, in this point also resembling *Ampullaria*, but differing from all *Paludinæ;* lastly, the right lip is slightly reflected (reconvrant), which is also characteristic of the genus in which we have placed it. Right lip acute, quickly thickening but with no rim within, sinuose, especially at base, when viewed in profile; left lip thickened, especially towards the posterior angle of the aperture, and obliquely appressed so as to blend with the columella which is rounded, thick, and reflected, with a small umbilical opening behind it. This shell comes from the Ohio and most of the North American rivers. Length from 45 to 50 mill. (*Deshayes.*)

Reeve, *l. c.*, places *Paludina ponderosa* in the synonymy of *Pal. decisa.* It is, indeed, difficult to draw the line between the two.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8841	3	Coosa River, Ala.	W. G. Binney.	.....
8842	1	" "	"	.....
8843	2	....	"	.....
8848	3	Ohio.	Acad. Nat. Sc.	Cab. series.
9152	2	Alabama.	.....	.....
9332	9	Coosa River, Ala.	Showalter.	.....
9333	12	" "	"	.....
8925	6	Illinois.	.....	*regularis*, teste Lea.
8926	4	"	I. Lea.	" [Cab. ser.
9016	1	.....	.....	.....

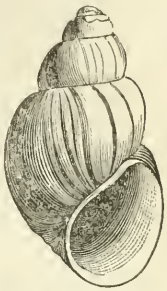
Melantho decisa, Say.—Shell imperforate, elongate-ovate, rather thick, smooth, surface hardly broken by lines of growth, with microscopic revolving striæ; greenish, with irregularly disposed brown streaks marking the edge of former peristomes, uniformly chalky white under the epidermis; spire truncated, one or two whirls of it alone remaining, apex entirely removed; remaining whirls $3\frac{1}{2}$, convex, the last equalling two-thirds of the shell's length, imperforate; aperture oval, oblique, more than one-half the length of the last whirl, bluish-white within; peristome externally of a darker color, simple, acute, somewhat sinuous, its terminations joined by a thin callus on the parietal wall, entering within the aperture. Length of axis 37, greatest breadth of body whirl 17; length of aperture 16, breadth 11 mill.

Fig. 79.



Melantho decisa.

Fig. 80.



Melantho decisa.

Fig. 81.

Melantho decisa.

Operculum arcuated, convex, horny, concentric, nucleus nearer the columellar margin.

Fig. 82.

Operculum of *Melantho decisa.*

Limnæa decisa, Say, Nich. En. ed. 1, 1817; ed. 2, 1818, pl. iii, f. 6.

Paludina decisa, Say, 1817, Nicholson's Encycl. pl. iii, f. 6 (*Limnæa* of earlier editions); Amer. Conch. I, pl. x (1830); ed. Binney, p. 49, 159, pl. x, fig. 1, pl. lxx, fig. 6; ed. Chenu, 16, pl. ii, f. 5.—Philippi, Conch. III, 3, pl. i. f. 8 (1848).—Haldeman, Mon. p. 4, pl. i (1840).—Gould, Invert. of Mass. 227, wood-cut, p. 144 (1841).—Adams, in Thompson's Hist. of Vermont, p. 151, fig. (1842).—DeKay, N. Y. Moll. p. 84, pl. vi, f. 131; vii, 134 (1843).—Chenu, Ill. Conch. i, f. 1–5.—Mrs. Gray, Fig. Moll An. pl. cccx, f. 10.—Potiez et Michaud, Gall. des Moll. I, 247, pl. xxv, f. 13, 14.—Küster in Chemn. ed. 2, p. 13, pl. ii, fig. 14–19.—Reeve, Con. Icon. 45, *a*, *c*, *d*, excl. 45 *b* (= *Pal. ponderosa*), Mar. 1863.

Melania ovularis, Menke, Syn. Meth. p. 134, teste Küster.

Paludina limosa, Valenciennes, Rec. d'Obs. II, p. 253, 1833, teste Küster and Haldeman.

Paludina ponderosa jun., Deshayes in Lam. VIII, 516 (1838), ed. 3, III, 455.

Paludina heterostropha, Kirtland, Ohio Rep. p. 175 (1838).—Tappan, Am. Journ. Sc. [1], XXXV, p. 269, pl. iii, p. 2, 1839.

Paludina microstoma, Kirtland, Ohio Report, p. 175 (1838).

Paludina rufa, Haldeman, Mon. III, p. 3 of wrapper, pl. iii, f. 1 (1841).

Paludina cornea, Valenciennes? Rec. d'Obs. II, 255, 1833.

Paludina integra, Say, 1821, Binney's ed. p. 69; Journ. A. N. Sc. II, 174 (1821).—Haldeman, Mon. p. 10, pl. iii (1840).—Adams, in Thomp. Vermont, p. 152 (1842).—DeKay, N. Y. Moll. p. 84, pl. vii, f. 132 (1843).—Küster, Chemn. ed. 2, p. 17, tab. iii, f. 11–13.—Chenu, Ill. Conch. pl. i, f. 9–13.—Philippi, Conch. III, 4, pl. i, f. 7 (1848).

Paludina genicula, Conrad, N. Fr. W. Shells, p. 48, pl. viii, fig. 3, 1834; ed. Chenu, 23, pl. iv, f. 20.—Küster in Chemn. ed. 2, p. 14, pl. iii, fig. 5, 6 (1852).—Müller, Syn. Test. in 1834 prom. p. 39.—Haldeman, Mon. p. 15, pl. v (1840).—DeKay, N. Y. Moll. p. 86 (1843).—Chenu, Illust. Conch. pl. i, f. 18–19.

Paludina heros, DeKay, olim, N. Y. Prel. Rep. 1839, p. 32; Moll. p. 85 (1843).

Paludina subsolida, Anthony, Proc. Ac. N. Sc. Phila. 1860, p. 71.—Tryon, Phil. Pr. 1862, 452.

Paludina decapitata, Anthony, Proc. A. N. S. Phila. 1860, p. 71.—Reeve, Con. Icon. pl. xi, f. 75 (1863).

Paludina milesii, Lea, Proc. Phila. Acad. Nat. Sc. 1863, 156.

Helix dissimilis, Wood, Ind. Suppl. pl. vii, f. 18 (1828); Hanley's ed. p. 226 (1856).

Helix decisa, Eaton, Zool. Text-Book, 196 (1826).

Lymnula ventricosa, Rafinesque, MSS.

Ambloxis (*Amblostoma*) *major*, Rafinesque, MSS.

Cochlea Virginiana, &c., Lister, Conch. t. cxxvii, f. 27 (1770).

Petiver, Gazophyl. t. cxvi, f. 18.

Found in all eastern North America, from the Rio Grande to Nova Scotia and the Canadas.

The first point to be decided in considering this species is what shell Mr. Say had before him in drawing up the description of *Limnæa decisa*, which name was subsequently changed to *Paludina decisa*. It is from the original description and figure alone that this point can be decided. They are both copied below, as given in the American edition of Nicholson's Encyclopedia.

Limnæa decisa, Say.—Shell subconic, olivaceous, truncated at the apex; whirls four, wrinkled across and banded with minute distant striæ; terminal whirl very short; suture impressed and conspicuous; aperture subovate, more than half of the length of the shell, entire; within bluish-white. Operculum coriaceous, elevated on the disk and concentrically striated. Length one inch, breadth three-fourths.

Fig. 83.

Limnæa decisa.

Cochlea virginiana é flava viridescens, non fasciata. Lister, Conch. tab. cxxvii, fig. 27.

The young shell resembles *P. subcarinata*, but the whirls

are destitute of an elevated line, the suture is not so deeply impressed, and the aperture is narrower above.

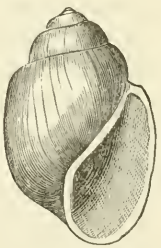
Animal with the foot larger, suddenly a little dilated each side before and truncate in front, widely; foot livid, thickly maculated with irregular orange spots, which are much smaller beneath; head and tentacula spotted with orange; eyes on a prominent angle, at the external base of the tentacula.

I found the animal viviparous in October; the young shell had then three complete whirls, which were spirally striated. (*Say.*)

In the above description no locality is given, but there can be no doubt that the shell described is the form common in the Delaware River. I have, therefore, taken this form to be the type of the species. From one of these my description and figures 79 and 81 are drawn. Younger specimens are proportionally more globose than the one figured, and the spire is often not truncated, but consisting of 5 whirls, the apex being perfect. Fig. 80 is drawn from a specimen found in the Susquehanna, more elongated in shape, and truncated at the apex alone. In New England and Canada the shell is less elongated, with more pyramidal spire.

Say figured another shell as *Paludina decisa* in the American Conchology, and gave two figures of it, from one of which my figure 84 is copied. At this time he repeated the description from the Encyclopedia, and added the following remarks and references.

Fig. 84.



Paludina decisa.

This species is common in various parts of the Union. Dillwyn informs us that Müller and others have incorrectly quoted Lister's figure for their *Helix angularis*. *Petiver*, Gaz., pl. 106, fig. 18. (*Say.*)

The figure copied above does not agree with that given in Nicholson's Encyclopedia. I should rather refer it to *Melantho ponderosa* (page 37).

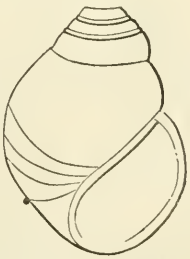
Fig. 85.

Helix dissimilis.

To the typical form of *M. decisa* the following synonyms may without doubt be referred.

Figure 85 is a fac-simile of *Helix dissimilis*, Wood, of which no description nor locality is given. It is evidently intended for this species, though the true name *decisa* is

Fig. 86.



Cochlea, &c., LISTER.

applied by Wood to a figure of *subcarinata*. I also give a facsimile (fig. 86) of Lister's figure.

Paludina heterostropha of Kirtland's Ohio Report is referred by Gould (Boston Proc. I, 32) to *Mel. ponderosa*. Judging from the figure given of it by Tappan, I would rather refer it to *decisa*. It is so considered by Reeve. This figure is copied in my fig. 87, while the description furnished Tappan by Dr. Kirtland is as follows:—

Paludina heterostropha, KIRTLAND, l. c. — Sinistral; aperture more than half the length of the shell. Shell subglobose, ovate; spire depressed, apex generally truncate; whirls 5; aperture ovate, with its superior extremity curved towards the body whirl, within bluish-white; epidermis greenish horn color, usually coated with ferruginous clay. Length $\frac{3}{4}$ inch.

Fig. 87.

Paludina heterostropha.

This shell frequently occurs in Mill and Yellow Creeks, tributaries of the Mahoning River. I formerly considered it a mere variety of *P. decisa*, Say; but on further examination found it to be specifically distinct. It never attains more than half the length of that species; its spire is never depressed, and it is always heterostrophal. (*Tappan.*)

To the copy of the description of *Paludina decapitata*, of Mr. Anthony, given below, I am able to add Fig. 88, drawn from the type, which he kindly loaned me for the purpose. I do not consider this a well-established species. The single specimen on which it is founded is evidently an undeveloped specimen in a very imperfect state. The spire is eroded, the shell presents the appearance of belonging to a small ill-favored individual of *M. decisa*. However, the only information we have regarding it, given below, may serve to identify it, should it appear in future.

Paludina decapitata, ANTHONY.—Shell globular, thin, of a light green color; spire truncate, but never elevated under any circumstances, composed of about four very flat whirls; aperture broad, ovate, one-half the length of the shell, within dusky white; columella regularly but not deeply rounded, with a slight deposit of callus, and having a very small linear umbilicus at base.

Fig. 88.

Paludina decapitata.

Tennessee. My Cabinet.

A single specimen only is before me, and therefore I claim it as a new species with some hesitation; it seems to me, however, too unlike any of the ordinary forms in this genus to warrant its being included with any of them; it is the most globose of any species hitherto published, if we except the small, round forms which were long since removed, and very properly too, to

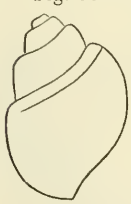
Amnicola; the spire is entirely wanting, but traces of the sutures show the number of whirls; and its present appearance forbids the idea of its ever having had an elevated spire. (*Anthony.*)

The fac-simile which I have given of Haldeman's figure, drawn from the original specimen of *Paludina genicula*, Conrad (Fig. 89), would lead one to consider that species identical with *Viv. decisa*. I do not, therefore, hesitate to unite them; my opinions are founded on an examination of a series of shells from the locality which furnished Mr. Conrad's specimen, which show a gradual series from the rounded whirls of the *decisa* to the angular form of *genicula*, though none of the shells were as well marked as that figured. From other localities, also, I have received specimens of *decisa* whose six whirls were quite as angular and scalariform. I suppose Higgins refers to some such in quoting *Pal. genicula* from the Ohio and Scioto Canal (Cat. 6). In Küster's Paludina (Chemn. ed. 2), Cedar Creek is also given as a locality for *genicula*. Mr. Conrad's description is as follows. Fig. 90 is a fac-simile of his. It is considered identical with *decisa* by Reeve.

Fig. 89.

Paludina genicula.

Fig. 90.



Paludina genicula.

Paludina genicula.—Shell suboval, spire slightly elevated; volutions 4, scalariform, shoulders angulated; apex eroded, aperture rather more than half the length of the shell; epidermis green olive; within bluish.

A species which is readily distinguished from those nearest allied to it by the angulated whirls. I found a single specimen in Flint River, Ga. (*Conrad.*)

Lymnula ventricosa, Rafinesque, of whose description and figure (fig. 91) a copy is here given, is evidently this species. His figure, though very rough, is quite characteristic.

Fig. 91.

Lymnula ventricosa.

Lymnula ventricosa.—Whirls 4, last one very large; form obtuse-oval; aperture bluntly oval, &c. (*Rafinesque.*)

Fig. 92.

Lymnea eburnea, Raf.

From the same MS., "Conchilogia Ohioensis," which was presented to the Smithsonian Inst. by Prof.

Haldeman, I find rough figures (fig. 92) of *M. decisa* under the name of *Ambloxis*, *Amblostoma*, or *Lymnulus major*, Rafinesque, or *Lymnea eburnea*, Rafinesque. All these names are given, and I find it impossible to decide which was the one finally fixed upon, or to decipher more of the description than the following :—

Whirls 5, last very large, form obtuse oval, aperture obtuse oval, lip thickened within, columella covered with callus. (*Rafinesque.*)

I put *Melania ovularis*, Mke., in the synonymy on the authority of Küster (Chemn. ed. nov.), who so quotes it. I have seen no authentic specimen, but cannot doubt its identity with *M. decisa*.

Melania ovularis, Menke, (l. c.)—Shell ovate-conoid, truncate, substriate, shining, greenish, reddish-brown when old, truncated at apex; aperture ovate, columella subcallous above; aperture rounded before.

Length 1 inch; breadth 7 lines.

Hab.—Near Cincinnati, in the Ohio River. Bescke. (*Menke.*)

Paludina limosa, Valenciennes, is considered a synonym of *M. decisa* by Haldeman and Küster. I have seen no authentic specimen. It is also considered a synonym by Reeve, *l. c.*

Paludina limosa, Valenciennes (l. c.)—Shell ovate-conic, thin, subdiaphanous, green; whirls 5, longitudinally striate; labrum acute.

Paludina limosa, Say, Journ. Phil. I, 125.

This *Paludina* is less globose and longer than that of our climate. The height at the last whirl is a little less than of the others. Its breadth is greater than its length, and its surface is covered with somewhat strong longitudinal striæ. The form of the aperture is also more oval. Its vertical diameter is the longest.

The lip is sharp, continued to the columella, which is not appressed.

The shell is not very thick; there are, however, some individuals which are eroded like some of the bivalve shells.

The apex is destroyed as the animal grows, and a flat circular partition is formed, having the axis of the shell in its centre, in about the same manner as in *Bulimus decollatus*.

I saw one individual whose three apical whirls were destroyed so as to give a broken appearance to the shell.

Length rather more than one inch. (*Valenciennes.*)

The following also is cited as a synonym of *M. decisa* by Reeve. Judging from the description I should so consider it.

Paludina cornea, Valenciennes (l. c.)—In the Delaware and many other rivers of the United States there is found a horn-colored *Paludina*, which at first sight resembles the *Pal. limosa*, but which a more careful examina-

tion proves to be sufficiently distinct to form a new species. On account of its color I call it

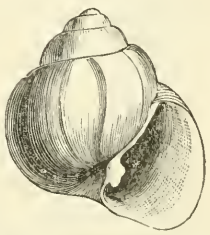
Paludina cornea.—Shell ovate-conic, thin, opaque, greenish horn color; whirls 5, subrounded; sutures deeply impressed.

This species has an obtuse apex; the last whirl is one-third longer than the others; each of them has a kind of flattening (aplatissiment) which forms a balustrade (rampe) around the spire, whose sutures are deeply impressed. The striæ of growth are vertical and fine. The aperture is oval. Horn colored, with a greenish tinge; the interior of the mouth and lip is white.

The largest individual was 11 lines in length. (*Valenciennes.*)

Figure 93 represents a deformed specimen of *Melantho decisa*, from the Susquehanna. It is introduced here for the purpose of showing how abnormal an individual of a species may be.

Fig. 93.



Melantho decisa, deformed.

Another abnormal form of *Melantho decisa*, in which the whirls are more numerous and tapering, which is often met with in any large number of specimens, has been described as a distinct species as *Paludina milesii*. The original description is given below, as well as a figure of one of the original specimens, presented by Prof. Miles.

Fig. 94.

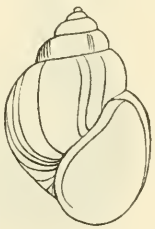
Paludina milesii.

Paludina milesii.—Shell smooth, subpyramidal, subsolid, imperforate; spire lengthened; sutures deeply impressed; whirls 6, subinflated; aperture somewhat small, subovate; labrum acute, somewhat sinuose; columella somewhat thickened both above and below.

Branch Lake, Antrim Co., Michigan. M. Miles. (*Lea.*)

No. 8921–4 of the collection were presented by Dr. James Lewis under the unpublished name of *Paludina obesa*, Lewis. Fig. 95 represents one of them. This form is a well marked variety, found near Mohawk, N. Y., in Ohio, and Michigan. It is readily distinguished by its very ventricose, rounded form and dark olive green color. Its name is preoccupied.

Fig. 95.



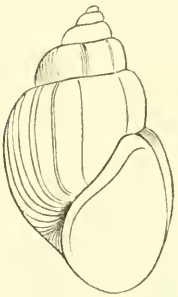
Paludina obesa.

It is customary, in collections, to separate the more elongated forms of *Melantho decisa* under the name of *M. integra*. It becomes necessary, therefore, to ascertain what shell Mr. Say had before him in drawing up the description of *Palu-*

dina integra. I have, therefore, copied below his description, and given a figure (96) of his typical specimen still preserved in the collection of the Philadelphia Academy.

Paludina integra, Say.—Shell olivaceous, pale, conic; whirls six, wrinkled across; spire rather elongated, entire at the apex; suture profoundly indented; aperture subovate, less than half of the length of the shell.

Fig. 96.



Paludina integra.

Inhabits the waters of the Missouri. Length $\frac{1}{4}$ inch.

Very much resembles *P. decisa;* the spire, however, is more elongated, and never truncated at the apex, but always acute. (*Say.*)

The dimensions given above are probably a typographical error.

The large number of specimens which I have had the opportunity of examining have exhibited so many and so slight degrees of difference between *M. decisa* and *M. integra*, that I am persuaded of their specific identity. I am supported in this view by the recent monograph of Mr. Reeve, but opposed in it by most of the American collectors. I have given below a description and figure of what is usually acknowledged to be *Paludina integra.* The difference of form of the sexes is shown also, Fig. 98 being male, Fig. 97 being female.

Melantho decisa, var. *integra.*—Shell imperforate, elongate-ovate, quite thick, smooth, surface hardly broken by lines or wrinkles of growth, marked with delicate revolving striæ; greenish, with darker streaks, marking the edge of former peristomes, uniformly chalky white under the epidermis; spire elongated-conic, apex perfect, acute; whirls 5, convex, the last equalling two-thirds the shell's length, imperforate; aperture oval, narrowed above, oblique, more than half the length of the body whirl, milky white within; peristome externally of a darker color, simple, acute, somewhat sinuous, its terminations joined by a thin, transparent callus on the parietal wall of the aperture,

Fig. 97.

Female of *M. decisa*, var. *integra.*

Fig. 98.

Male of *M. decisa*, var. *integra.*

more heavily thickened and white above and below. Length of axis 24, greatest breadth of body whirl 15; length of aperture 15, breadth 11 mill.

Operculum as in *M. decisa*.

In general terms it may be said that the form known as *M. integra* differs from *M. decisa* by being more elongated, having a perfect apex, a smaller aperture, more prominent revolving striæ, and a whiter aperture. These characters are only comparative. The two forms are not distinguished by any decided, constant, specific characters. Fig. 99 represents young shells, which are more globose, comparatively, than the more mature ones.

Fig. 99.

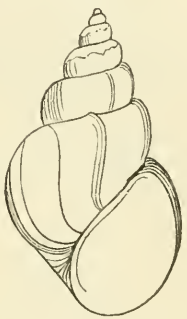
Young of *M. integra*.

Fig. 100.

M. integra, deformed.

Two curiously deformed specimens of *M. integra* in the collection are figured in Figs. 100 and 101.

Fig. 101.



M. integra, deformed.

Reeve places *Paludina ponderosa* in the synonymy of *Pal. decisa*. On page 37 will be found an enumeration of the constant specific characters of *Melantho ponderosa*.

Paludina microstoma, Kirtland, is added to the synonymy on authority of Mr. Anthony, who tells me Prof. Kirtland described it before meeting with the description of *integra*. On seeing Mr. Anthony's cabinet he was at once convinced of their identity.

Paludina microstoma, l. c.—An undescribed species of *Paludina*, found frequently associated with the *P. decisa*, and distinguished by its elongated spire and small mouth. (*Kirtland.*)

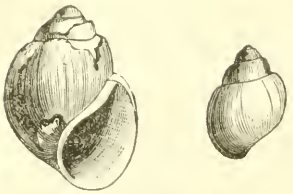
Fig. 102.

Paludina rufa.

Paludina rufa, Haldeman, is said by him (l. c.) to be distinguished by a reddish color and entire apex, but may be a variety of *Pal. decisa*. The reddish or pinkish tint within the aperture (sometimes divided into bands) appears to distinguish this form of the species, which occurs in the Southern as well as Northern States. Prof. Haldeman's original specimen of *Pal. rufa*, together with all those from which

the plates of his Monograph were drawn, are deposited by him in the collection of the Academy at Philadelphia. Fig. 102 is a facsimile of the figure referred to by Haldeman under this name. No. 8905 of the collection represents it. This variety is represented by eight of the lots catalogued below in the museum register. One of them has the spire truncated, the surface very much eroded, a more globose form, and more sinuous peritreme than usual (see Fig. 103). The whole shell under the epidermis appears of a rosy hue.

Fig. 103.

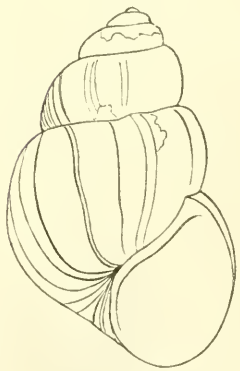


M. integra, var. *rufa*.

Paludina subsolida, Anthony, appears to me also a synonym of this species. My opinion is founded on an examination of Mr. Anthony's specimen, kindly lent me for figuring (Fig. 104). It is also so considered by Reeve. No. 9311 was presented to the collection under this name by Mr. Anthony. His description here follows.

Paludina subsolida, Anthony.—Shell ovate, imperforate, very thick; color light green, verging to brown in old specimens; spire much elevated, composed of 6—7 inflated whirls; sutures very distinct; aperture broad-ovate, about one-third the length of the shell, within white; lip curved forward and forming a very conspicuous, subacute tip near its base; columella well rounded, a thick callous deposit covering the umbilicus. Length 2 inches, breadth 1¼ inches.

Fig. 104.



Paludina subsolida.

Illinois. My cabinet; cabinet of Hugh Cuming, London.

This is the most ponderous species in the genus, far exceeding *P. ponderosa*, Say, in that respect; compared with that species it is not only much more solid and heavy, but its spire is proportionally more elongate, whirls more convex, while the body whirl is less ventricose, and the aperture is uncommonly small for a *Paludina* of its size; the body whirl is disposed to be angulated near its middle; all the whirls are more or less shouldered and the lines of growth are very conspicuous; the body whirl is obscurely striate concentrically, and its surface thereby modified so as to present a faintly sculptured appearance, and the striæ being somewhat finely undulated the appearance under a microscope is very pleasing. (*Anthony.*)

Paludina heros, DeKay, of one of the earlier Zoological Reports of New York is said by that author to be a large form of *Pal. integra*. (N. Y. Moll. p. 85.)

Fig. 105 represents the lingual dentition of *M. integra*. Lingual membrane composed of forty-eight rows of teeth, arranged in the form common to the group 3, 1, 3. Central tooth broad, short, and hooked, a small shoulder each side near its base; first lateral broad and hooked; second and third lateral long, claw-shaped; anterior part of membrane broad, narrowing toward the middle, and again widening at its posterior portion. First twelve or fourteen rows translucent brown in color, the rest colorless.

Fig. 105.

Lingual dentition of *M. integra*.

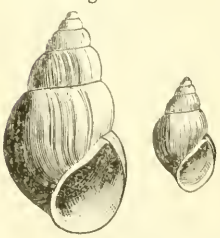
The animal of this species is given in Fig. 68, p. 35.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8876	3	.....	W. G Binney.	Cabinet series.
8877	1	.....	Dr. J. Lewis.	"
8878	4	.....	W. G. Binney.	"
8879	6	Burlington, N. J.	.....	"
8880	1	Blue River, K. T.	Dr. J. G. Cooper.	.....
8881	3	Massachusetts.	W. Stimpson.	.....
8882	4	Nimahaw River, K. T.	Dr. J. G. Cooper.	.....
8883	4	New York—Erie Canal.	Dr. J. Lewis.	.....
8884	7	Grand Rapids, M.	"	.....
8885	3	N. Illinois.	R. Kennicott.	.....
8886	4	Erie Canal, N. Y.	Dr. J. Lewis.	.....
8887	3	"	"	.....
8888	2	"	"	.....
8889	2	"	"	.....
8890	7	Quasqueton, Iowa.	E. C. B.	.....
8891	3	Jerseyville, Ill.	.....	.....
8892	1	Big Sionx.	Dr. F. V. Hayden.	.....
8893	2	Milwaukee, Wis.	I. A. Lapham.	.....
8894	6	Sangemon River, Ill.	D. H. Roberts.	.....
8895	4	Mohawk, N. Y.	Dr. J. Lewis.	.....
8896	7	Illinois.	W. G. Binney.	.....
8897	7	Miss. River.	.....	.....
8898	1	Maryland.	A. N. S.	.....
8899	2	Maine.	"	.....
8900	2	Greenwich, N. Y.	Dr. Ingalls.	.....
8901	6	Texas or Alabama.	W. G. Binney.	.....
8902	2	Big Prairie Creek, Ala.	Dr. Showalter.	.....
8903	3	New York.	Dr. Lewis.	Revolving bands.
8904	5	Batavia, Ill.	W. G. Binney.	.....
8905	3	Grand Rapids, Mich.	Dr. Lewis.	(*Pal. rufa*, Hald.)
8906	7	E. Georgia.	Dr. Jones.	.....
8907	1	Vermont.	Acad. N. Sc.	.....
8908	8	Buffalo, N. Y.	Nasons.	.....
8909	7	Alabama.	.....	.....
8910	10	Burlington, N. J.	W. G. Binney.	.....
8911	1	Alabama.	.....	.....
8912	9	Hiram, O.	.....	.....
8913	1	Elyria, N. Y.	.....	.....
8914	10	.....	.....	.....
8915	10	Athens, Ga.	.....	(*Pal. rufa.*)
8916	2	Aztalan, Wis.	S. F. Baird.	.....
8917	3	Schuyler's Lake, N. Y.	Dr. J. Lewis.	.....
8918	4	Racine, Wis.	S. F. Baird.	.....
8919	2	Texas.	W. G. Binney.	.....

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8920	507	Mohawk, N. Y.	Dr. J. Lewis.	(*P. rufa.*)
8921	6	Grand Rapids, Mich.	"	*P. obesa*, Lewis.
8922	2	Columbus, O.	"	"
8923	1	Ohio.	"	"
8924	2	"	"	" Cab. ser.
9018	1	New York.	"	.....
9021	1	Delaware River.	W. G. Binney.	.....
9029	1	Coosa River.	"	.....
9027	30+	Grattan, Mich.	Dr. J. Lewis.	.....
9028	7	Reed's Lake, Mich.	"	.....
9029	200+	Grand River, Mich.	"	.....
9030	250+	Michigan.	"	.....
9031	300+	Brest, Mich.	"	.....
9032	50+	.....	"	.....
9033	100+	Mohawk, N. Y.	"	.....
9034	20+	Grattan, Mich.	"	.....
9035	900+	.....	"	.....
9036	20+	Mohawk, N. Y.	"	.....
9037	100+	"	"	.....
9038	50+	"	"	.....
9039	7	Erie Canal, N. Y.	"	.....
9040	11	"	"	.....
9041	9	"	"	.....
9042	12	Mohawk River.	"	.....
9043	13	"	"	.....
9044	4	Erie Canal.	"	.....
9045	10	Mohawk River.	"	.....
9046	12+	Erie Canal.	"	.....
9047	9	Mohawk River.	"	.....
9048	6	Canal, Mohawk.	"	.....
9049	6	"	"	.....
9050	10	Grand Rapids, Mich.	"	.....
9051	7	Grattan, Mich.	"	.....
9052	11	Grand Rapids, Mich.	"	.....
9053	7	Erie Canal.	"	.....
9054	3	.....	"	.....
9055	100+	Mohawk, N. Y.	"	.....
9151	20+	.....	.....	.....
9155	2	Owasco Lake.	Mrs. H. W. Parker.	.....
9153	3	Cayuga Lake.	"	.....
9157	..	.....	.....	.....
9197	7	Lynn, Mass.	Dr. Prescott.	.....
9198	1	Schuylkill.	Gen. Totten.	.....
9199	3	South Carolina.	"	.....
	5	Santee Canal.	Ravenel.	.....
9330	..	.....	.....	.....
9334	9	Arkansas.	.....	.....
9311	1	.....	L. Agassiz.	.....

Melantho coarctata, LEA.—Shell imperforate, ovately turreted, thick, the surface decussated by revolving striæ and lines of growth; light greenish horn color, with darker longitudinal streaks marking the margins of former peristomes, white under the epidermis; spire elongated, apex entire; whirls 6, regularly increasing, slightly convex, the last one equalling more than one-half the shell's length, imperforate, sometimes compressed and obtusely carinated; aperture

Fig. 106.



Melantho coarctata.

Fig. 107.

Melantho coarctata.

scarcely oblique, ovate, longer than wide, more than half the length of the body whirl, within white; peristome simple, acute, sinuose, its margins not on the same plane, its terminations connected by a heavy shining callus upon the parietal wall. Length of the axis 22, greatest breadth of body whirl 15; length of aperture 15, breadth 9 mill.

Paludina coarctata, Lea, Tr. Am. Phil. Soc., IX, 30 (1844); Obs. IV, 30; Proc. II, 243 (1842).—Reeve, Con. Icon. 46 *a* (Feb. 1863).

Paludina lima, Anthony, Proc. Acad. N. S. Phil. 1860, p. 70.—Reeve, Con. Icon. 46 *b* (Feb. 1863).

Paludina exilis, Anthony, Proc. Acad. N. S. Phil. 1860 p. 71.

Paludina compressa, Lewis in *Sched.* (Unpublished.)

It has been found in South Carolina, Alabama, Mississippi, and Arkansas.

The striæ of growth, very much decussated by revolving deep cut lines, distinguish all the forms mentioned in the synonymy, and constitute one of the chief characteristics of the species. In form it seems capable of some considerable variation, being, at times, very slender and elongate, at others much more ovate, with more globose whirls.

I give below a copy of Lea's description, and a drawing of his original specimen (Fig. 108).

Having before me the original specimens of *Pal. lima* and *exilis*, kindly loaned me by Mr. Anthony, and one determined by Mr. Lea to be his *Pal. coarctata*, I cannot hesitate in uniting them under one specific name, which, of course, will be the earliest published. No. 8867 of the Smithsonian collection is also a specimen of the same, though presented by Dr. J. Lewis under the unpublished name of *Pal. compressa*, Lewis.

Mr. Lea has enabled me to figure his original specimen (Fig. 108). I am able also to add figures of the shells from which Mr. Anthony drew his description of *Pal. lima* (Fig. 110) and *exilis* (Fig. 109). The latter shell is rather more slender than the other forms, one specimen being only thirteen mills. wide, though thirty-one long.

Reeve places *P. exilis* in the synonymy of *P. coarctata*, but considers *P. lima* distinct.

Paludina coarctata, Lea.—Shell smooth, ovate, compressed, thick, imperforate, olive color; spire drawn out; sutures much impressed; whirls flattened; aperture rather small, ovate, white.

Fig. 108.

Paludina coaretata.

Alabama. E. Foreman, M. D. Cabinet of Dr. Foreman. Diam. .50, length .98 inch.

This species, of which a single specimen only was received, differs from all of the genus which has come under my notice. It is remarkable for its compressed form, the body whirl being quite flattened. The apex is eroded, which prevents the number of whirls being ascertained: there appear to be five. The aperture is less round than usual in this genus, and may be rather more than half the length of the shell. (*Lea.*)

Paludina exilis, Anthony (*l. c.*).—Shell turreted, smooth, rather thick; color light apple-green; spire elevated, composed of about seven volutions: suture well marked; aperture small, broad-ovate, livid within; body whirl distinctly angulated, subumbilicate, and with very distinct lines of growth; columella well rounded and curved with a callous deposit, connecting perfectly with the outer lip, thus forming a continuous rim.

Fig. 109.

Paludina exilis.

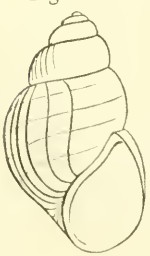
Length, $1\frac{1}{4}$ inch; breadth, $\frac{3}{4}$ inch.

Hab.—Mississippi. My Cab.; Cab. H. Cuming, London; A. N. S. Philadelphia; State collection, Albany, N. Y.; Smithsonian collection.

Obs.—One of the most slender of our American species; *Paludina subsolida*, nob., is more ponderous, more globose, and has a larger aperture; no other species approaches it in general appearance; the whirls of this species taper more rapidly to an acute apex than in most of the species; compared with *P. integra*, Say, it is more slender, more solid, and the aperture is much smaller. (*Anthony.*)

Paludina lima, Anthony (*l. c.*).—Shell ovate, rather thin, dark green; spire obtusely elevated and composed of six convex whirls, which are strongly striate or subcarinate; sutures very distinct, and the upper part of each whirl being flattened renders it more conspicuous; aperture broad-ovate, about half the length of the shell, livid within; columella slightly rounded and callous deposit small; umbilicus none.

Fig. 110.



Paludina lima.

Length, $1\frac{1}{4}$ inch; breadth, $\frac{3}{4}$ inch.

Hab.—South Carolina. My Cab.; Cab. H. Cuming, London; A. N. S., Philadelphia; Smithsonian collection, Washington, D. C.

Obs.—In general form not unlike our western *P. integra*, Say, from which it differs, however, by its revolving, raised striæ and by its carinæ, which are also well developed; the lines of growth are very strong, and decussating with the striæ give the surface a beau-

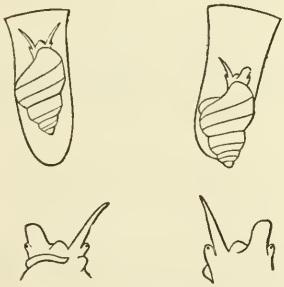
tifully rough appearance, which suggests its specific name. It is really one of our handsomest species, and so unlike all others that no American species can readily be mistaken for it. In most specimens the body whirl is very strongly carinate about the middle, and the outer lip is considerably produced as in *P. subsolida*, nob. (*Anthony.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8865	13	Natchez, Miss.	Lieut. Wailes.	.....
8866	6	"	"	Cabinet series.
8867	2	Jackson, Miss.	Dr. Lewis.	*V. compressa*, Lewis.
9331	9	Big Prairie Creek, Ala.	Dr. Showalter.	.....

LIOPLAX, Troschel.

Foot very large, rather thin, elongated, greatly produced beyond the snout, truncated before, and becoming slightly narrower behind towards its rounded extremity. Colors as in *Melantho*. Head very small. Snout very short. Lingual teeth smooth at their apices or cusps. Tentacles broader and rather shorter than in *Melantho*. Right tentacle in the male very short, only one-third the length of the left, and broader than the snout. Lingual dentition as in *Melantho*. Right cervical lappet narrow, not plicated, but extending beneath the right tentacle and snout, nearly to the base of the left tentacle. Left cervical lappet very small. Branchiæ as in *Melantho*. (*Stimpson.*) Operculum with a subspiral nucleus.

Fig. 111.



Female. Male.
Animal of *L. subcarinata*.

Fig. 112.

Lingual dentition of *L. subcarinata*.

Fig. 113.

Operculum of *Lioplax subcarinata*.

Shell thin, ovate-turreted, imperforate, spire produced, whirls rounded, carinated, covered with a thin epidermis; peristome thin, continuous.

Lioplax cyclostomatiformis, Lea.—Shell subcylindrical, rather thick, pale horn color, smooth, imperforate; spire exserted, at the apex rose colored and obtuse; sutures very much impressed; whirls five, rounded; aperture small, nearly round, within salmon colored.

Fig. 114.

Lioplax cyclostomatiformis.

Coosa River, Alabama. Dr. Brumby. My cabinet, and cabinets of Dr. Griffith, Dr. Jay, L. W. Sloat, and Dr. Foreman. Diam. .32, length .82 of an inch.

This is a very remarkable species, assuming very much the form of an exserted *Cyclostoma*. A single, somewhat worn specimen only, was received. The aperture is rather more than one-third the length of the shell. Its subcylindrical form is very remarkable.

Since the above description was written, Dr. Jay and Dr. Foreman have placed in my hands specimens from the same locality. The epidermis is perfect, and they are of a greenish horn color. The interior of the aperture is bluish, while the apex is slightly salmon colored. (*Lea.*)

Paludina cyclostomatiformis, Lea, Tr. Am. Phil. Soc. IX, pt. i, p. 23 (1844); Obs. IV, 23; Proc. II, 83, (1841).—Reeve, Con. Icon. 43 (Feb. 1863).

Paludina contorta, Shuttleworth, of Küster in Chemn. ed. 2, p. 20, pl. iv, f. 7–9 (1852).

Paludina elliotti, Lea, Proc. Acad. Nat. Sc. Phila. 1858, p. 166.

The specific name of this species must not be confounded with that of *Pal. cyclostomæformis* of D'Orbigny (Mag. de Zool. 1837, cl. v, pl. ixxix, f. 1)

The outline of the back of the shell reminds one of the Cuban *Megalomastoma*.. The three upper whirls are sometimes of a very light flesh color, contrasting with the dark green of the remainder. The peristome is sometimes continuous, being appressed to the body whirl, and forming a rimate umbilicus. On some specimens I have detected minute revolving lines.

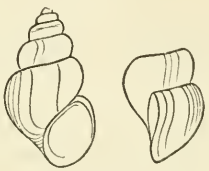
Pal. elliotti is a finer, better developed form of the species than that described as *cyclostomatiformis*, and has more acutely carinated upper whirls. A careful examination of Mr. Lea's types leads me to consider them identical. With his original description of the latter I have given Fig. 114 from his type, while below will be found the description of *Pal. elliotti* and a figure (115) of a specimen presented me under this name by Mr. Lea and now in the Smithsonian collection (No. 9015).

I have placed *Paludina contorta* in the synonymy of this species after a careful examination of a specimen received by Mr. Bland

from Mr. Shuttleworth. The original description given below, and the copy of the figures (Fig. 116) confirm my opinion of its identity with Mr. Lea's shell.

Since the publication of this paper in the form of proof, Mr. Gill has criticized my opinion of the identity of *Pal. elliotti* with *P. cyclostomatiformis*. His opinion was not based on an examination of specimens, and has since been changed on seeing the Smithsonian series.

Fig. 115.



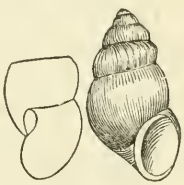
Paludina elliotti.

Paludina elliotii, Lea (*l. c.*).—Shell subcarinate, pyramidal, rather thick, greenish-olive, smooth, very narrowly umbilicated; spire elevated, subacute, flesh-colored at the apex; sutures excavated; whirls 7, rounded, obtusely carinated above, rather small; aperture subrotund, small, white within.

Othcalooga Creek, Ga. Bishop Elliott. (*Lea.*)

Paludina contorta, Shuttleworth (*l. c.*).—Shell non-rimate, cylindrically conic, subovate, shining, greenish with olive lines; apex eroded; whirls 6, strongly convex, divided by a deep suture, the middle ones carinated in the middle; aperture oblong, white; peristome straight, acute, curved above.

Fig. 116.



Paludina contorta.

Shell smooth, cylindrical-conic, turreted with a truncated apex; shining, green, with olive brown lines and striæ; sutures deep; whirls 6, ventricose, moderately increasing above, rapidly so towards the base, the middle ones clearly carinate in their centre, with brown angular curving striæ and lines at the middle keel; last whirl shorter than the penultimate, and near the upper portion of the aperture separated so as to form a deep groove of the suture. Aperture longitudinally rounded, inner lip appressed; peristome straight, acute, twisted above (fig. 9), curving again below its centre, beautifully rounded below and regularly blending with the columella. Height 8‴, breadth 5 ‴.

Alabama (Rugel), coll. Charpentier. (*Küster.*)

Reeve, *l. c.*, adopts the same view of *Pal. elliotti* and *contorta* as I have done.

No. 9147 of the collection is almost ecarinate, and nearer Mr. Lea's type of *cyclostomatiformis* than *elliotti*.

It is singular that the only two known species of *Lioplax* should share the peculiarity of having a strongly carinated form with perfect apex, as well as a form with rounded whirls and truncated apex.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8868	1	Coosa, River, Ala.	W. G. Binney.	.....
8869	1	Alabama.	A. N. S. Phila.	Cabinet series.
9015	1	Georgia.	I. Lea.	Figured in Fig. 115.
9149	1	Coosa River, Ala.	Dr. E. R. Showalter	.....

Fig. 117.

Paludina subcarinata.

Lioplax subcarinata, Say.—Shell with three whirls, which are rounded, and subcarinated, reticulated with striæ and wrinkles, sometimes without the striæ; suture deeply impressed; apex truncated and re-entering; aperture more than half of the length of the shell, oval; elevated lines or subcarinæ on the body two, three, and sometimes none. Length half of an inch, breadth four-tenths.

Inhabits with the preceding species. (Delaware River.)

Animal viviparous, with a chestnut, coriaceous operculum, white, spotted with orange; head pale orange, not extending beyond the shell; tentacula darker, short, subulate; eyes situated at their base, elevated, black and conspicuous; base of the animal much advanced, broad, truncate, purplish before, tail rounded behind. (*Say.*)

Limnæa subcarinata, Say, olim. Nich. Enc. ed. 1, 1817; ed. 2, 1818, pl. ii, f. 6.

Paludina subcarinata, Say, Nich. Enc. ed. 3, 1819, pl. i, f. 7; ed. Binney, p. 47, pl. lxix, f. 7.—Haldeman, Mon., p. 8, pl. ii (1840).—De Kay, N. Y. Moll., p. 87 (1843).—Chenu, Conch. Ill., pl. i, f. 6–8.—Philippi, Conch. II, 7, pl. ii. f. 7 (1846).—Küster, in Chemn. ed. 2, p. 29, pl. vi, fig. 10–14.—Reeve, Con. Icon. 44 (Feb. 1863).—Not of Potiez et Michaud.

Paludina sulculosa, Menke, Syn. Meth. p. 134 (1830).

Paludina bicarinata, Potiez et Michaud, Gal. des Moll., I. 249, pl. xxv, f. 17, 18.

Helix decisa, Wood, Cat. Suppl. p. 21, pl. vii, f. 17 (1828); Hanley's ed. 226, f. 17 (1856).

Helix subcarinata, Eaton, Zool. Text-Book, 195 (1826).

Lioplax subcarinata, Troschel, Gebiss der Schn. 100 (1857).

There are in the mature perfect shell 3 more whirls than the number given by Mr. Say. It is a very variable shell. The whirls are sometimes truncated at the apex, very much rounded and hardly marked by the carinæ (Fig. 118), which in other localities are much developed, continuing to the sharp, well-defined apical whirls, on which is no trace of erosion (Fig. 119). Sometimes there is a prominent revolving

Fig. 118.

Lioplax subcarinata.

Fig. 119.

Lioplax subcarinata.

Fig. 120.

Lioplax subcarinata.

elevated ridge below the carina on the body whirl. The revolving striæ are sometimes very strongly marked.

The operculum, which in the young shell is subspiral, in its later growth is concentric as in the other species of *Viviparidæ*.

Fig. 121.

Operculum of *Lioplax subcarinata.*

I have received specimens from Ohio, Indiana, Kentucky, Pennsylvania, and New Jersey.

Paludina sulculosa, Menke, *l. c.*, appears to me to be this species. I have seen no authentic specimen. His description is as follows:—

Paludina sulculosa.—Shell ovate-conoid, apex deroded; imperforate, thin, decussately striated, transversely lightly sulcated; green; whirls 4, angulated on the spire; suture deep; aperture ovate; lip simple. Length 4½, breadth 3 lines.

Ohio River at Cincinnati. Bescke. (*Menke.*)

Paludina bicarinata, Potiez and Michaud, is certainly this species, as shown by their description and the copy of the outline of their figure given below.

Paludina bicarinata, Pot. et Mich. (l. c.) not Say.—Shell oval, ventricose, brown or greenish, covered with numerous transverse ridges, two of which are more developed on the last whirl, the other whirls having but one medial carina; spire comprised of three or four convex whirls, of which the first are usually truncate; aperture ovoid; peristome simple. Length 12–15, breadth of last whirl 10–12 mill.

Fig. 122.

Paludina bicarinata.

Mr. Say and Ch. des Moulins have both given the same name to two different shells belonging to this genus, consequently it becomes necessary, in order to avoid confusion, to change that of Des Moulins, being posterior to Mr. Say's. Moreover, M. des Moulins' shell having three carinæ, will be better designated by the name *tricarinata*, adopted in this catalogue.

Delaware River, N. America. (*Potiez et Michaud.*)

Fig. 123.

Paludina decisa, Wood.

I give also an outline of Wood's figure (Fig. 123) of *decisa*, of which no description is given, though it is specified as "tawny Delaware." It is evidently *Lioplax subcarinata.*

In addition to the above fac-similes I have given one of Say's figures in Nicholson's Encyclopedia (Fig. 117.)

Fig. 124.

Lingual dentition of *Lioplax subcarinata.*

The lingual dentition of *Lioplax subcarinata* is thus figured by Troschel (Fig. 124). There are seven teeth in each row, with recurved, simple, acute apices, the central broad at the base, narrower above, the laterals narrower. For the animal see p. 55.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8870	50+	Raritan River.	W. G. Binney.	.....
8871	5	.....	W. Stimpson.	Cabinet series.
8872	20	Burlington, N. J.	W. G. Binney.	.....
8873	9	Ohio.	W. Stimpson.	.....
8874	2	Licking River, Ky.	W. G. Binney.	.....
8875	8	Laporte, Ind.	"	Ecarinate.
9013	1	.....	.....	Figured in Fig. 119.
9056	30+	Laporte, Ind.	Dr. Lewis.	.....
9057	20+	Bank Lick, Ky.	"	.....

Doubtful, Spurious, and Extra-limital Species of Viviparidæ.

This completes the list of known North American *Viviparidæ.* There now follow notices of doubtful species and those which have been erroneously referred to the genus.

In the Trans. Lit. and Hist. Soc. Quebec, I, 196, occur the two following descriptions by Mrs. Shepard:—

Paludina ———.—Shell white; epidermis olive; spire the length of the aperture; last whirl inflated. Island of Orleans.

Paludina ———.—Shell pale buff; spire longer than the aperture; top obtuse. Found with the foregoing on the beach at the island; the whirls are not so much inflated as those of this genus generally are, but I think it would not range under any other; it has bluish bands of gray round the top of the whirls.

Paludina alleghanensis, Green.—Shell conical; spire elevated and rather obtuse; whirls four, rounded and nearly smooth, the ultimate whirl the largest; mouth oval, slightly angular near the upper part of the peristome, where it adheres to the body whirl; umbilicus none: epidermis dark brown color. Length two-tenths of an inch. Fine specimens of the shell are in the cabinet of Mr. W. Hyde. Mountains of Pennsylvania. (*Green.*)

Paludina alleghanensis, Green, in Doughty's Cabinet of Nat. Hist., II, p. 291 (1832).

The above is Green's description. I have not been able to obtain any information about the species. From the size and shape of the shell I should incline to believe it to be an *Amnicola.*

Paludina solida, Say, is mentioned by name only by Cristofori & Jan, Conch. Terr. et Fluv. p. 7 (1832).

Paludina canaliculata, Gould, is mentioned by name only in the Preliminary Report on Mass. Shells, p. 107, and by Wheatley, Cat. 29.

Paludina unicolor, Lam., from South Carolina, mentioned by name only by Wheatley in his Cat. of U. S. Shells, p. 30. I have never known of any such species having been found there.

Vivipara bengalensis, Lam. (*Pal. elongata*, Swainson.—*Pal. multilineata*, Say, N. H. D. II, 245, 1829, Binney's ed., p. 146.—*Pal. vitula*, Rafinesque, (Bengal.) Atl. Journ., V. 109), said to have been found in St. John's River, Fla. Mr. Say's words are as follows: "Capt. Leconte presented me with a shell which, he informed me, he found in the River St. John, Florida. I described it nearly four years since under the name of *multilineata;* but, recently, being about to publish it, on a more attentive examination and comparison with a specimen of the *elongata* from Calcutta, given to me by Mr. Hyde of Philadelphia, I have concluded that it varies from that specimen only in having the umbilicus a little smaller."

See also *Ampullaria rotundata*, p. 6.

I have seen some specimens said to have come from Florida which might be referred to this species, but at present cannot consider its existence there sufficiently established to admit it in the list of American *Vivipara*. Haldeman (Mon., p. 24, pl. vii, f. 3, 4), thus describes and figures it, considering it probable that it was accidentally introduced into Florida together with *Ampullaria rotundata*, Say. They are both Calcutta shells:—

Fig. 125.

Paludina bengalensis.

"Shell lengthened, conic, and polished; composed of six or seven convex whirls, the surface of which is covered with minute transverse wrinkles, and numerous narrow spiral bands; apex pointed; suture deep; lines of accretion very fine; aperture regularly rounded, produced posteriorly. Color bright green, often passing into brownish; the spiral bands are fuscous, and the inside white." See also Haldeman, Mon. 24, pl. vii, f. 3, 4 (1841).

Paludina minuta, Say, of Küster, Chemn. ed. ii, p. 52, pl. x, f. 15–16, is *Cingula minuta*, Totten. Mr. Say never described any such species. I have not given Küster's description as he quotes Totten's description, leaving no doubt of its identity.

Paludina hyalina, Lea, Tr. Am. Phil. Soc. VI, 17, pl. xxiii, f. 81 (1839), (not of Morelet), is a distorted *Planorbis exacutus*, q. v. (Land and Fr.-Wat. Sh. II.)

Paludina turrita, Menke, Syn. Meth. p. 40, is mentioned by name only, *Cyclostoma marginatum*, Say, being mentioned doubtfully as a synonym.

Paludina aculeus, KÜSTER, Chemn. ed. ii, p. 73, pl. xiii, f. 8–9, is there said to be *Cingula aculeus*.

Paludina scalaris, JAY, Cat. 3d ed. 112, pl. i, f. 8, 9 (1839) = *Physa scalaris*, q. v. (Land and Fresh-Water Shells, II.) The name is also used in Zeit. für Mal. II, 164, 1845, by DUNKER.

Paludina porata, SAY, is mentioned by name only in MENKE's Syn. Meth. p. 42 (1830) with *P. katschkana*, PARR. and *P. fluminensis*, ZIEGLER, as its synonyms.

Paludina castanea, VALENCIENNES, Humboldt and Bonpland, Rec. d'Obs. II, 256, is not specified as American. The description was drawn from a specimen in the Paris Museum, locality unknown.

Paludina viridis of Virginia is quoted without description by SOWERBY (Tank. Coll. p. 43), *Helix viridata*, BUDGIN MS. being given as a synonym.

Paludina maxima, RAVENEL, Cat. 12 (1834), is unknown to me. No description was ever published.

Paludina decipiens is mentioned by name only among the American species added to those cited in Lamark's Animaux sans Vertebres, by GOULD's translation (p. 70, Genera of Shells). I have no information concerning it.

Finding *Pleurocera* of Rafinesque quoted in the synonymy of *Viviparа* by Adams, Gen. Rec. Moll., I was inclined to place the following species in *Vivipara*, but now omit them. See Rafinesque's Complete Writings, 1864, pp. 65 and 67.

Pleurocera acuta, Enum. and Acc., p. 3.
Pleurocera rugosa, " " " p. 3.
Pleurocera gonula, " " " p. 2.
Pleurocera verrucosa, Ann. of Nat., No. I, p. 11 (1820).

The genus *Pleurocera* is considered by Haldeman (Mon. of *Leptoxis* and Encycl. Icon., Baird's ed.) to be the same as *Io*, Lea, which last name not having priority of publication would be considered a synonym of *Pleurocera*. The following description of Rafinesque is translated from the Journal de Physique, &c. of Brussels, LXXXVIII, p. 423. The fac-simile Fig. 126 is from a MS. work of the same author, "Conchologia Ohioensis," presented by Prof. Haldeman to the Smithsonian Institution.

Pleurocera, *l. c.*—Shell spiral, oval or pyramidal, numerous rounded whirls; aperture oblong, oblique, base prolonged, twisted, narrowed above; outer lip thin, interior lip appressed to the columella, which is smooth and twisted, without umbilicus. Animal with a membranaceous operculum, proboscis-like head, inserted on the back; tentacles two, lateral, subulate, sharp, eyes at their exterior base. Family of *Turbinacea*. Species numerous, of which I have already twelve, all fluviatile, from rivers and creeks. (*Rafinesque.*)

Fig. 126.

Pleurocera.

Omphemis plaioxis and *lacustris* of Rafinesque are mentioned by name only (Journ. de Phys. LXXXVIII, p. 424. The generic description is as follows:—

Shell oval; aperture rounded, lips detached, columella separated from the lower lip by a small oblong umbilicus; spire slightly oblique; animal with a membranaceous operculum, two flattened lateral tentacles, eyes at their exterior base. Family *Turbinacea*. Two species, *O. lacustris* and *plaioxis*, which is fluviatile. (*Rafinesque.*)

I take this opportunity of giving a fac-simile of a figure of the animal of *Leptoxis* as well as Rafinesque's description, translated from the work referred to, p. 424. The figure (127) is copied from the same MS. as that quoted on the last page, written in the well-known hand of Rafinesque.

Fig. 127.

Animal of *Leptoxis*.

Leptoxis, l. c., differs from *Lymnula* by its oval, ventricose shell of two or three whirls; aperture oval, almost as large as the whole shell; eyes exterior. Four species, fluviatile, &c. (*Rafinesque.*)

To the genus *Somatogyrus* (q. v.) must be referred the following:—

Paludina altilis, Ravenel, undescr. Cat. S. C. 12 (1834).
Paludina pallida, Lea.
Paludina subglobosa, Say.
Paludina fontinalis, Phil.
Paludina isogona, DeKay.

To the genus *Amnicola* (q. v.) must be referred the following:—

Paludina sayana, Küster, Chemn. ed. 2, p. 48, pl. ix, f. 30–32.
Paludina emarginata, Küster, *l. c.* p. 50, pl. x, f. 3, 4.
Paludina cincinnatiensis, Küster.
Paludina porata, Küster, *l. c.* and of Philippi.
Paludina lustrica, Küster, *l. c.*
Paludina granosa, Say, of Kirtland's Ohio Report, p. 174 (1838), and Sill. Am. Journ. [1] XXXI, 36 (1836); probably *Amnicola granum*, Say.
Paludina grana, Say.
Paludina limosa, Say.
Paludina obtusa, Lea (not of Troschel).

To the genus *Pomatiopsis* (q. v.) must be referred the following:—

Paludina lapidaria, Küster, *l. c.*
Paludina nickliniana, Lea.

To the genus *Fluminicola* (q. v.) must be referred—

Paludina nuttalliana, Lea.
Paludina nuclea, Lea.
Paludina virens, Lea.
Paludina seminalis, Hinds.

To the genus *Leptoxis* are to be referred the following species:—

Paludina dissimilis, Say (Binney's ed. p. 48); DeKay, N. Y. Moll. 86 (1843), and Potiez & Michaud, Gal. des Moll. I have not considered it necessary to repeat Mr. Say's description, the species being well known and universally acknowledged to be a *Leptoxis*.

Paludina crenata, Say, is mentioned as a species of *Leptoxis* by Dr. Brot in his admirable "Matériaux pour servir à l'étude de la famille des Mélaniens," p. 24. Mr. Say described no such species. Prof. Haldeman describes a *Leptoxis* under this name in the Monograph referred to by Dr. Brot. See also *Somatogyrus*.

Fig. 128.

Paludina humerosa.

Paludina humerosa, Anthony, *l. c.*—Shell ovate, thick, bright green, imperforate; spire rather obtusely elevated, composed of about 5—6 convex whirls; upper whirls smooth, body whirl and preceding one strongly striate and granulate or subgranulate; sutures very distinct; aperture ovate, nearly one-half the length of the shell, livid within.

Length about half an inch.

Alabama. My cabinet.

A single specimen only is before me, but it is sufficiently distinct; its granulated surface and the broad shouldering of the whirls are its chief characteristics; compared with *P. geniculu*, Con., it is more slender, darker in color, and its granulated surface is of itself a sufficient distinction. (*Anthony.*)

Paludina humerosa, Anthony, Proc. Acad. Nat. Sc. Phila. 1860, p. 71.

From an examination of Mr. Anthony's type I have no doubt of this being a nodulous species of *Leptoxis*, on which the nodules are slightly developed. Fig. 128 is drawn from it.

To the genus *Melania* are to be referred—

Paludina virginica, Say, Nich. Enc. 3d ed. (1819).

Paludina rudis, Ravenel (Cat. of Cabinet, p. 12, 1834). No description was given by Dr. Ravenel, who informs me that he found the species at Danville, on the Dan River, and subsequently sent some specimens to Mr. Lea, who described them as *Melania inflata*.

Paludina nitida, Ravenel (Cat. of Cabinet, p. 12, 1834). No description was published. Dr. Ravenel informs me that on submitting specimens to Mr. Lea he pronounced them an undescribed species of *Melania*. They were found in the Dan River, at Danville.

To the genus *Bithynia* (q. v.) has been referred the following:—

Paludina tentaculata, Lin.

To the genus *Lithasia* is to be referred—

Paludina incrassata, Lea. — Shell smooth, elliptical, rather thin, imperforate, dark horn color; sutures somewhat impressed; whirls somewhat convex; columella thickened above; aperture rather round, small, within bluish.

Fig. 129.

Paludina incrassata.

Alabama. E. Foreman, M. D. Cabinet of Dr. Foreman. Diam. .52, length . . . inch.

Rather more than the first whirl only of the specimen before me is perfect, and I would not have proposed it for a new species, but that this part differs from any which has come under my notice. The callus on the superior part of the columella is very like that we find in the genus *Anculosa*. The aperture is smaller than usual in this genus. The upper whirls being decollate, neither their number nor the form of the spire can be given. (*Lea.*)

Paludina incrassata, Lea, Tr. Am. Phil. Soc. IX, 30 (1844); Obs. IV, 30; Proc. II, 243 (1842).

The figure given above (Fig. 129) is taken from Mr. Lea's original specimen. I have not seen others.

Paludina thermalis, Linn., is quoted by Philippi from the United States, *Turbo minutus*, Say, being given as synonym (Arch. f. Nat. 1844, 28).

Fossil Species of Viviparidæ.

Dr. Meek furnishes the following list of fossil American *Viviparæ*, most of which were first described as *Paludinæ*:—

Vivipara vetusta, Meek & Hayden	Phila. Proc.	1860,	43; 1856, 121.
Vivipara leaii, "	"	1860,	184; 1856, 121.
Vivipara retusa, "	"	1860,	185; 1856, 122.
Vivipara conradi, "	"	1860,	185; 1856, 122.
Paludina peculiaris, "	"		1856, 122.
Vivipara trochiformis, "	"	1860,	185; 1856, 122.
Vivipara leidyi, "	"		1856, 123.
Vivipara raynoldsana, "	"		1861, 446.

Vivipara nebrascensis (*Paludina multilineata*, Meek & Hayden, Phila. Proc. 1856, 120); 1860, 430.

Vivipara glabra, H. C. Lea, teste Conrad, Proc. Phila. A. N. S. 1862, 567.

Family RISSOIDÆ.

Lingual teeth 3, 1, 3; the rows being more transverse and less arcuated than in the *Littorinidæ*. Rhachidian tooth broader than long, and armed with basal denticles (so called

by Troschel) on each side, which may be either on the basal margin, or on the anterior surface of the tooth above the base; cusp recurved and denticulated. Intermediate tooth

Fig. 139.

Lingual dentition of *Amnicola sayana.*

more or less hatchet-shaped, having a handle-like process (peduncle) projecting outwardly from the base of the broad body which is denticulated at the upper margin. Lateral teeth generally slender and armed with numerous minute denticles at their superior margins. Shell small, spiral, turreted or depressed, often more or less umbilicated; aperture more or less rounded, never truly channelled in front; peritreme continuous. Tentacles elongated, with the eyes at their outer bases. Verge (male organ) exserted, situated on the back at a considerable distance behind the right tentacle. Gills both pallial; the right or principal one usually rather short and broad, and composed of few laminæ, which are much broader than high. Foot oblong, truncate before, rounded or pointed behind. Operculigerous lobe well developed. Operculum horny or partly shelly, spiral or concentric.

Station in fresh, brackish, or sea water, rarely on land. Distribution mundane.—[*Stimpson.*]

Dr. Stimpson subdivides the *Rissoidæ* into the following subfamilies:—

Bythininæ, with an ovate shell, a concentric operculum which is calcareous within, and with cervical lobes. They are comparatively large. Fresh water. Genus *Bythinia*, Gray.

Rissoininæ, with an ovate or turreted shell, and a thick, corneous, subspiral operculum provided with an internal process (articulated). Size small. Marine. Genus *Rissoina*, D'Orb. (See Stimpson's paper, p. 39.)

Rissoinæ, with an ovate or elongated shell, and a subspiral operculum not provided with a process. Foot without lateral

sinuses. Rhachidian tooth of the lingual ribbon with the basal teeth on the inferior margin. Size small. Marine. Genera *Rissoa*, Frem., *Cingula*, Flem., *Alvania*, Risso, *Onoba*, H. & A. Ad., *Setia*, H. & A. Ad., *Ceratia*, H. & A. Ad.

Skeneinæ, with a depressed, almost discoidal shell, and a corneous, paucispiral operculum. Minute. Marine. Genus *Skenea*, Flem.

Hydrobiinæ, with shell and operculum and foot like those of the *Rissoinæ*, but with the rhachidian tooth of the lingual ribbon having the basal teeth on the anterior surface, behind the lateral margins. Size variable; some are minute, some as large as *Bythiniæ*. Living in fresh or brackish water. Genera *Hydrobia*, Hartm., *Littorinella*, Braun, *Amnicola*, Gould & Hald., *Bythinella*, Moq.-Tand., *Stenothyra*, Benson, *Tricula*, Benson, *Pyrgula*, Christ. & Jan, *Paludestrina*, D'Orb., *Tryonia*, Stm., *Potamopyrgus*, Stm., *Lithoglyphus*, Muhlfeldt, *Fluminicola*, Stm., *Gillia*, Stm., *Somatogyrus*, Gill, *Cochliopa*, Stm.

Pomatiopsinæ, with the shell and operculum as in the *Rissoinæ*. Foot with lateral sinuses. Size small. Amphibious. Genus *Pomatiopsis*, Tryon.

The land and fresh-water species only are included by me in the following pages. The figures are all somewhat enlarged.

BYTHINELLA, Moq.-Tand.

Lingual dentition of *B. thermalis*, according to Troschel: Rhachidian tooth moderately long, with the infero-lateral angles much produced. Intermediate tooth with the body longer than

Fig. 131.

Lingual dentition of *Bythinella nickliniana*.—[Stimpson.]

broad. Formula of the denticles: $\frac{9}{1+1}$ - 6 - 18 - 0. Tentacles tapering, but blunt at tip. Foot rather narrow, rounded behind.

Verge (in *B. ferrusina*) bifid. Shell elongated-ovate, usually somewhat pupiform, imperforate, or simply rimate; apex obtuse. Aperture oval or rounded; peritreme continuous, slightly thickened. Operculum corneous, with the nucleus moderately large, not very close to the basal margin.

Station, fresh water.

Distribution, Europe and North America. (*Stimpson.*)

Bythinella attenuata, HALD.—Shell unusually long, slender, with 6 or 7 obliquely revolving, very convex whirls, separated by a deep suture; aperture small, ovate, with the peritreme level and continuous; labium in contact with the body whirl, leaving scarcely any perforation.

Fig. 132.

Bythinella attenuata.

Color pale-green beneath an extraneous coating of black. Taken from a spring in Montgomery County, Virginia, connected with Roanoke River.

I am not confident that this is not the adult of *nicliniana*, as there is a very close resemblance between that shell and the young of this species, when it has but four volutions. In the latter, the aperture appears to be rather contracted. (*Haldeman.*)

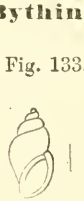
Amnicola attenuata, HALDEMAN, Mon. pt. 4, p. 3 of wrapper (1842); IB. Mon. p. 22, pl. i, f. 13 (1844?); IB. Journ. Acad. N. Sc. Phila. VIII, 200 (1842); IB. Proc. I, 78 (1841).

Amnicola elongata, HALDEMAN, *l. c.* in plate.

It is also said to inhabit New York. *Amnicola elongata*, Jay, of the Smithsonian Check Lists, is probably this species. No synonymy or reference is given by Dr. Jay (Cat., p. 278).

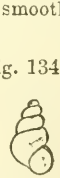
Bythinella nickliniana, LEA.—Shell turreted, green, smooth; apex obtuse; whirls 4, convex; aperture ovate. Hot Springs, Va. Diam. two-twentieths; length three-twentieths inch.

Fig. 133.



Paludina nickliniana.

Fig. 134.



Bythinella nickliniana.

This shell, with several other species, was brought by Mr. Nicklin from the Hot Springs of Virginia, and kindly placed in my cabinet. It lives in a rivulet, whose channel is supplied by the waters of a hot and a cold spring. The *Physa aurea* inhabits the same stream. It is the smallest species I know in our country, except the *granosa* of Say. It is rather larger, and very much resembles the *viridis* Lam. Its habitat, however, is very different, as the *viridis* lives in cold fountains. (*Lea.*)

Paludina nicklíniana, LEA, Tr. Am. Phil. Soc. VI, 92, pl. xxiii, f. 109 (1839); Obs. II, 92.

Amnicola nicklíniana, HALDEMAN, Mon., p. 21, pl. i, f. 12 (1844?).

Mr. Lea's figure (Fig. 133) not being as correct a representation as desirable of the species, I add another (Fig. 134), copied from Haldeman.

The lingual dentition is figured on page 131.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8972	100+	Fishing Creek, Clinton	.....	Teste Lea.
8931	3	" [Co., Pa.	.....	Cabinet series.

Bythinella tenuipes, COUPER.—Animal "with the head proboscidiform, sub-bifid, sub-cylindrical; foot strap-shaped, anterior portion extending laterally, and emarginate before; tentacles setaceous; eyes at the external base of the tentacles; color, except the head and eyes, mottled white.

Shell "small, one and a half lines long, subumbilicated, oblong-ovate, turreted, thin, smooth, lines of growth very slightly marked; color light brown; volutions five, suture slightly impressed; aperture ovate, oblong, angulated above, rounded at base; labrum simple, sharp.

Fig. 135.

Bythinella tenuipes.

"Found in the rice-field ditches at Hopeton, Georgia; movement active, made by the joint action of the head and foot, the head advancing before the foot; floats on the surface of the water in an inverted position." (*Couper in Haldeman.*)

Amnicola tenuipes, COUPER, in HALDEMAN'S Mon. 23, pl. i, f. 14–15 (1844?); No. 7, p. 4 of wrapper (1844).

Bythinella binneyi, TRYON.—Shell minute, elongated, consisting of 4 to 5 very convex whirls; apex somewhat obtuse; aperture ovate or nearly suborbicular, both lips rounded; umbilicus very small. Color light horn. Length 3, diam. 1.6; length of aperture 1.25, breadth 1 mill.

Fig. 136.

Pomatiopsis binneyi.

Bolinas, California. Rev. J. Powell. My cabinet and cabinet of Mr. Powell. Some specimens of this very small and exceedingly fragile species were sent to me; they exhibit, however, all the stages of growth from the very young to adult form. None of them retained the operculum. It is much smaller than any other species of *Pomatiopsis*, and is not likely to be confounded with any of them. It approaches nearest in form to two European species of *Bythinia*, *B. acuta* and *B. viridis;* the former, however, has a more lengthened, acute spire, and the latter is a more robust and ventricose shell. (*Tryon.*)

Fig. 137.

Bythinella binneyi.

Pomatiopsis binneyi, TRYON, Proc. Phila. Acad. 1863, 148, pl. i, f. 10.

Mr. Tryon's description is given above, as well as a fac-simile of his figure (Fig. 136). I have also given another figure of his original specimen.

Bythinella obtusa, LEA.—Shell subcylindrical, rather thin, dark-green, smooth, slightly perforate; spire short; at the beaks very obtuse; sutures impressed; whirls four, convex; aperture small, nearly round.

Fig. 138.

Bythinella obtusa.

Ohio. Diam. .07, length .10 inch.

This is among the smallest of the genus, and may at once be distinguished by its obtuse apex, which has the appearance almost of being truncate. The whirls do not decrease regularly from the lower one to the apex, the greatest diameter being apparently across the second whirl. In form, therefore, it has the aspect of a *Pupa*. It answers partly to the description of *Paludina alleghaniensis*, Green, but seems to differ in the truncate appearance of the apex, and in its size. Two specimens were found in a box, with some other small species, kindly sent me by Dr. Kirtland. It is rather less than *Pal. nickliniana*, but differs from it in being less tapering to the apex. It closely resembles *P. viridis*, Lam., but is rather larger, and more obtuse. There were no opercula to examine in these specimens; aperture rather more than one-third the length of the shell. (*Lea.*)

Paludina obtusa, LEA, Tr. Am. Phil. Soc. IX, 13 (1844); Obs. IV, 13; Proc. II, 34 (1841).

Amnicola obtusa, HALDEMAN, Mon. p. 24 (1844?).

Figure 138 is drawn from Mr. Lea's original specimen.

TRYONIA, STIMPSON.

Shell perforate, elongated, turreted, subulate, acute at summit and rather pointed at base; surface longitudinally ribbed or plicated, not spinous; whirls numerous, shouldered. Aperture small, oblique, rhombo-ovate; and somewhat pointed, sinuated, and effuse at base; outer lip thin and sharp, projecting below; inner lip appressed to the whirl above, peritreme however continuous. Operculum and lingual dentition unknown.

Station, fresh water.

Distribution, Southern California. (*Stimpson.*)

Tryonia clathrata, Stimpson.—Whirls eight. Longitudinal ribs variable in number, usually about twelve to each whirl. Surface otherwise smooth, or marked with delicate incremental striæ. There is no trace of revolving striæ or lines. Length 0.2 inch.

Fig. 139.

Tryonia clathrata.

The specimens described are in a semi-fossilized condition, mostly white, though not chalky, but with an ivory-like hardness. Some of them are translucent, looking as if silicified. From the circumstances under which they were found, however, it is probable that the species existed within a very recent period, if not indeed now living.

Large numbers of specimens were found, in company with other dead fresh-water shells of the genera *Physa*, *Planorbis*, *Amnicola*, *Cyclas*, etc., in the basin of the Colorado Desert, Southern California, by Mr. Wm. P. Blake, on one of the Pacific Railroad Surveys. The basin is the bed of an ancient lake, now dry. The specimens collected by him are in the museum of the Smithsonian Institution. (*Stimpson.*)

Tryonia clathrata, Stimpson, Am. Journ. Conch. I, 54, pl. viii, f. 1, 1865.

The figure I have given is not a fac-simile of that of Stimpson.

Tryonia protea, Gould.—Shell elongate, slender, variable; whirls seven to eight, rounded, divided by a deep suture, simple or variously ornamented, and barred with revolving ridges and longitudinal folds; aperture ovate; lip continuous, simple, scarcely touching the penultimate whirl. Length of the largest specimen three-tenths, breadth, one-tenth inch.

Fig. 140.

Amnicola protea.

From the Colorado Desert (Gran Jornada), Dr. T. H. Webb, W. P. Blake.

Peculiar from its large size and slender form, though differing greatly in its relative proportions. It differs from all others, in being variously sculptured with revolving ridges and longitudinal folds, like most *Melaniæ*. It varies greatly also in the relative proportions of length and breadth. It is as slender as *Amnicola attenuata*, Hald., and much larger. This appears to be the same shell as that subsequently described by Mr. Conrad, under the name of *Melania exigua*. (*Gould.*)

Amnicola protea, Gould, Proc. Bost. S. N. H. V, 129 (March, 1855); P. R. R. Rep. V. 332, pl. xi. fig. 6—9 (1857); Prelim. Rep. App. 24 (1855); Otia, 217.

Melania exigua, Conrad, Proc. A. N. S. Phila. VII, 269 (Feb. 1855).

Two of Dr. Gould's figures are copied in my figure (140). With them may be compared Fig. 141, which is drawn from a specimen presented by Prof. Haldeman (No. 9143), and pronounced by Mr. Conrad to be his *Melania exigua*, it having been one of

the original specimens collected by Dr. Le Conte. Mr. Conrad's description, given below, bears an earlier date than that of Dr. Gould, but was not actually published at that time. I have, therefore, retained Dr. Gould's name. The two descriptions evidently refer to the same species.

Melania exigua.—Turreted; volutions 8, disposed to be angulated and somewhat scalariform above, cancellated, longitudinal lines wanting on the lower half of the body whirl; columella reflected; aperture elliptical. Length one-fifth of an inch. Colorado Desert, California. (*Dr. Le Conte.*)

Fig. 141.

Melania exigua, enlarged.

The specimens are numerous and of a chalky whiteness, showing that they are all dead shells. Said to have been found one hundred and twenty miles distant from any stream passed on the route. I am indebted to Dr. Caspar Parkinson and Mr. Mactier for specimens. (*Conrad.*)

Fig. 142.

Tryonia protea.

Fig. 142 is drawn from one of Dr. Gould's original specimens.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9143	4	Colorado Des.	Prof. Haldeman.	M. exigua, teste Conr.
9356	4	"	Mr. Mactier.	" "

COCHLIOPA, Stimpson.

Lingual dentition of the typical species: Rhachidian tooth short and broad; middle lobe of the basal margin very broad; basal teeth rather large. Intermediate tooth with a long peduncle, and square body having a cavity in the centre. Lateral teeth with an expansion of the inner side of the shank, separated from the summit by a deep rounded sinus; the outer lateral being more expanded than the inner. Formula of the denticles: $\frac{11}{2+2}$ - 8 - 18 - 24. Shell depressed-conic; base concave, carinated; umbilicus large and deep; aperture oblique. Operculum thin, corneous, sub-spiral. Rostrum of moderate size; tentacles rather long, tapering. Verge rather elongated, compressed, geniculated, and bifid, the inner branch being very small, less than one-fourth the size of the outer one and arising at the inner angle of the geniculation.

Station, fresh water.

Distribution, California. (*Stimpson.*)

Cochliopa rowellii, Tryon.—Shell depressed, wider than high, consisting of 3½ whirls, 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-whirl, forming an acute angle with the labrum above, and not impinging on the umbilicus. Surface marked with close, regular, minute striæ, which become enlarged in the flattened umbilical region into sharp crowded lines visible without a glass. Color light horn or yellowish, operculum darker. Operculum paucispiral, the lines of accretion very distinct and regular. Length 2.5, diam. maj. 4, min. 3; length of apert. 2, breadth 1½ mill.

Fig. 143.

Amnicola rowellii.

Clear Lake, California: Rev. J. Rowell. My cabinet and cab. of Mr. Rowell.

This species cannot be compared with any hitherto described, being much more depressed, and widely distinct in the form of the umbilical region. It may possibly form a species of the genus *Somatogyrus*, recently proposed by my friend Mr. Theo. Gill for a small mollusk from Iowa, which I described in the Proceedings of the Academy for Sept. 1862. (*Tryon.*)

Amnicola rowellii, Tryon, Proc. Phila. Acad. 1863, 147, pl. i, f. 8, 9.

Fig. 144.

Cochliopa rowellii, enlarged.

In addition to the fac-simile of one of the original figures of this species given above, Fig. 144 is drawn from No. 9312 of the collection, which was presented by Mr. Tryon.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9312	1	California.	G. W. Tryon.	Fig. 144.

GILLIA, Stimpson.

Lingual dentition of the type: Rhachidian tooth moderately long, deeply trilobate below; basal teeth close to the basal margin, and projecting beyond it. Intermediate tooth with the body subrhomboidal, slightly excavated in the middle. Outer

lateral tooth with a smaller number of denticles than the inner. Formula of the denticles: $\frac{9}{2+2}$ - 8 - 14 - 10. Shell rather large,

Fig. 145.

Lingual dentition of *Gillia altilis*.—[STIMPSON.]

subglobular, thin, subperforate, smooth; spire small; suture not impressed. Aperture large, broad, ovate, oblique; outer lip thin, acute, not projecting anteriorly. Operculum thin, corneous, regularly ovate. Rostrum rather broad. Tentacles tapering, pointed. Verge small, simple, lunate. Ova-capsules hemispherical, each containing a single egg, and deposited singly or in groups or linear series.

Station, fresh water.

Distribution, the eastern parts of the United States of North America. (*Stimpson.*)

Gillia altilis, LEA.—Shell smooth, subglobose, thick, pale horn-color; spire short; sutures small; whirls four, obtusely angular above; aperture large, nearly round, white.

Fig. 146.

Melania altilis.

Santee Canal, South Carolina: Prof. Ravenel; Susquehanna River at Havre de Grace, Md.

(*Paludina altilis*, Prof. Ravenel's letter.) My cabinet and cabinet of P. H. Nicklin. Diam. .27, length .32 inch.

Last summer I found a number of this globose little species on the banks of the Susquehanna, and then considered it new, but on examination I found I had the same species, Prof. Ravenel having sent it to me years ago under the name of *Paludina altilis*. I am not aware that Prof. R. has ever described it, never having seen any account of it. His specific name for it is retained, but I have placed it among the *Melaniæ*, it having a distinct spiral operculum. It belongs to a natural group in the genus *Melania*, which have very low spires and a very large body whirl. There is a very slight impression on the superior part of the whirls below the suture. The aperture is about two-thirds the length of the shell. The epidermis in young specimens is a very pale yellow, almost white. (*Lea.*)

Melania altilis, Lea, Proc. Am. Phil. Soc. II, 13 (1841); II, 150 (1842); Trans. VIII, 174, pl. v, f. 23; Obs. III, 12 (1843).—DeKay, N. Y. Moll. 95 (1843).

Paludina altilis, Ravenel, Cat. (no descr.).

Leptoxis altilis, Haldeman, Mon. Lept. 6, pl. v, f. 152 (1847?).

Mr. Lea also gives the river Schuylkill, at Philadelphia, as the habitat of this species (Pr. Am. Phil. Soc. II, 150). I have myself found it in great plenty in the Delaware, at Burlington, crawling on the mud exposed by the fall of the tide, together with *Amnicola limosa* and other species.

Mr. Lea's figure is copied in my Fig. 146.

Judging from the description and figure given by Haldeman of *Leptoxis crenata*, I should be inclined to refer it to this species, especially as its habitat is the same (Santee Canal). I have, however, followed the system of giving all the described species of this genus, without regard to synonymy—it being very difficult to decide doubtful cases. See the remarks under that species.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9217	4	Delaware River, N. J.	W. G. Binney.	.....

Gillia crenata, Haldeman.—Shell obliquely transverse, subglobose, polished, rather solid, with four convex whirls, and impressed suture; aperture oblique, very large, angular posteriorly. Peritreme continuous on the same plane. Color yellowish-green, aperture white.

Fig. 147.

Leptoxis crenata.

Paludina crenata, Say in cabinet.
Paludina altilis, Rav. in cab.

Fig. 148.

Leptoxis crenata.

Santee Canal, S. C.

Distinguished from *altilis* by its obliquity, greater thickness, straighter and thicker labium, comparatively shorter spire. In other respects the species are much alike. This seems to belong to the same genus as the European shells which Dr. Jay gave me as *Paludina naticoides* and *Lithoglyptus fuscus*. (*Haldeman.*)

Leptoxis crenata, Haldeman, Mon. 6, 67, pl. v, f. 153 (1847?).

The above is a copy of the original description and figure of this species. I am inclined to believe it to be identical with the

Gillia altilis of the Santee Canal. The shell found in the Delaware, and considered by Mr. Lea as *Melania altilis*, and included by me in the preceding article as a form of *Gillia altilis*, may prove to be a distinct species. If so, its synonymy will be *Leptoxis altilis*, Haldeman, not *Melania altilis*, Lea.

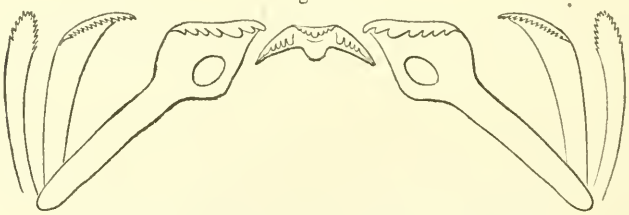
Doubtful Species of Gillia.

Leptoxis rapæformis, of Haldeman's Monograph, probably belongs to this genus. The species figured by him without name (pl. v, f. 157) certainly does.

SOMATOGYRUS, Gill.

Lingual dentition of type: Rhachidian tooth very short and broad. Intermediate tooth with the body perforated. Inner and outer lateral teeth with about the same number of denticles. Formula of the denticles: $\frac{7}{4+4}$ - 7 - 14 - 14. Shell rather large,

Fig. 149.



Lingual dentition of *Somatogyrus depressus*.—[Stimpson.]

globular, thin, smooth, perforate; spire small; suture impressed; body whirl globose, more or less shouldered above. Aperture large, oblique, rhombo-ovate, narrowly rounded in front and behind, with its peritreme thin and acute, and with its entire margin uniformly in one plane, the outer lip not projecting anteriorly. Operculum rather thick, corneous, subovate; inner margin concave near the upper extremity. Foot rather short. Rostrum broad. Tentacles tapering, pointed.

Station, fresh water.

Distribution, the central parts of North America. (*Stimpson.*)

Somatogyrus depressus, Tryon.—Shell orbicular, sub-hyaline; whirls four, convex, the last large, equalling five-sixths the length of the entire shell; umbilicus narrow; aperture semicircular, labrum appressed within; suture impressed. Length and breadth four mill. (Fig. mag. 2½ times.)

Fig. 150.

Amnicola depressa.

Hab. Mississippi River, at Davenport, Iowa: Prof. Sheldon. Coll. Acad. Nat. Sciences, and Smithsonian Institution, Prof. D. S. Sheldon, Geo. W. Tryon, Jr.

Shell subhyaline, rather solid, orbicular, with the spire depressed, consisting of four whirls; apex acute, suture profoundly impressed. Body whirl very convex, equalling five-sixths the length of the shell, narrowly umbilicate. Aperture semicircular, the inner lip being nearly straight. The only shell which this resembles is *Vivipara subglobosa*, Say, which differs in being double the size of *A. depressa*, with a rather more exserted spire, and in having a more concave inner lip. (*Tryon.*)

Amnicola depressa, Tryon, Proc. Ac. N. Sc. Phila. 1862, p. 452.
Somatogyrus depressus, Gill, Pr. Phil. Ac. 1863, 34 (no descr.).

Fig. 150 is drawn from Mr. Tryon's original figure.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9014	3	Davenport, Ia.	G. W. Tryon.	.....

Somatogyrus isogonus, Say.—Subglobose, horn-color, volutions about four, rounded, obsoletely wrinkled; spire very short, about one-third the length of the aperture; suture profoundly impressed, so as to form a shoulder on the whirls; aperture much dilated, oval, being as obtusely rounded above as at base; umbilicus linear, distinct; operculum obviously spiral. Length under three-tenths of an inch.

Fig. 151.

Somatogyrus isogonus.

Fig. 152.

Leptoxis isogona.

Inhabits Bear Grass Creek, near Louisville.

Not very numerous. It is remarkable by the oval form of the much dilated aperture, and by the deeply indented suture. In old specimens the base is almost acutely angulated. (*Say.*)

Melania isogona, Say, N. H. Diss. II, 227 (1829); Descr. 19; Binney's ed. 144.
Amnicola isogona, Lea, Tr. Am. Phil. Soc. IX, 16 (1844); Obs. IV, 16.—Woodward, Man. pl. ix, f. 23.
Paludina isogona, DeKay, N. Y. Moll. 85, pl. vii, f. 133.
Paludina pallida, Lea, Trans. Am. Phil. Soc. VI, 22, pl. xxiii, f. 104 (1839); Obs. III, 22.
?*Paludina fontinalis*, Philippi, Conch. II, 5, p. 2, pl. ii, f. 9 (1846).—Küster, Chemn. ed. 2, 56, pl. x, f. 27, 28.

Leptoxis isogona, Haldeman, Mon. 6, pl. v, f. 155 (*Mudalia*) (1847?).
Paludina subglobosa, Say, J. A. N. Sc. V, 125 (1825); Binney's ed. p. 115.—DeKay, N. Y. Moll. p. 86 (1843).—Haldeman, Mon. pl. x, f. 7, 8.

Mr. Lea's description and figure of *Paludina pallida* are copied below.

Paludina pallida.—Shell ventricose, thin, light horn-color, smooth; sutures impressed; whirls four, convex; aperture nearly round.

Near Cincinnati, Ohio: T. G. Lea. My cabinet. Diam. .3 length .4 inch.

Fig. 153.

Paludina pallida.

This shell has recently been found by my brother, and I believe has not before been observed. It might at first be mistaken for a young shell, on account of its pale yellow color and translucency. In form, however, it differs from any species I have examined, the last whirl being very much enlarged, and the aperture being very large. (*Lea.*)

A translation of Philippi's description of *Paludina fontinalis*, and a fac-simile of his figure here follow. The shell described by him may be *S. integer*.

Fig. 154.

Paludina fontinalis.

Paludina fontinalis.—Shell minute, subglobose, subperforate, solid, greenish-yellow; whirls four, convex, the last ventricose, twice the length of the shell; aperture ovate, dilated. Height $2\frac{1}{2}'''$ (lines), diameter $2\frac{1}{2}'''$; height of the aperture $1\frac{3}{4}'''$.

Melania integra, Say (ubi?), according to specimens.

Ohio, United States of America. (*Philippi.*)

An authentic specimen of *Paludina subglobosa*, preserved in the Philadelphia Academy, is without doubt identical with the shell received as Say's *Melania isogona*. A drawing of the specimen and copy of Say's description here follow.

The strict rules of nomenclature would require the substitution of *subglobosus* for *isogonus* as the specific name of this species. It does not, however, seem advisable in this case to abandon the name by which the species has so long been known.

Fig. 155.

Pal. subglobosa.

Paludina subglobosa, Say.—Shell subglobose; whirls three and a half, much rounded, rapidly enlarging; suture profoundly impressed; aperture subovate; umbilicus very narrow, nearly closed by the labrum; spire very short, convex.

Inhabits the Northwestern Territory. Length less than three-tenths of an inch.

I obtained this shell when traversing the northwestern part of the Union. It is much larger than the *porata*, nob., which it resembles considerably, but its whirls are much more rapidly enlarged, and the umbilicus is much narrower. (*Say.*)

Fig. 152 is from Haldeman's Monograph.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9216	2	Ohio.	W. G. Binney.	.....
9223	3	.....	.....	..... [Ward.
9224	4	Ohio.	Gen. Totten.	*Pal. subglobosa*, teste

Somatogyrus integer, Say.—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 whirl large, aperture dilated ovate, acute above; columella flattened, polished; labrum regularly rounded; base regularly rounded, without any undulations or sinus; umbilicus none; operculum obviously spiral. Length nearly one-fifth of an inch. Animal, foot longer than wide, rounded behind, with the anterior angles a little excurved; eyes black, conspicuous; tentacula rather long and slender.

Fig. 156.

Leptoxis integra, enlarged.

Inhabits the Ohio River and many of its tributaries.

This is a very common little shell, abounding more in many situations than any other species, particularly in the vicinity of the Falls of the Ohio. It may readily be taken for a young shell. (*Say.*)

Melania integra, Say, New Harm. Diss. II, 276 (1840); Descr. 19; Binney's ed. p. 144.—DeKay, N. Y. Moll. 96 (1843).
Anculotus pumilus, Conrad, teste Haldeman and Reeve.
Anculotus integer, Reeve, Con. Icon. 35 (1861).
Leptoxis integra, Haldeman, Mon. Lept. 6, pl. v, f. 154 (1847?).
Amnicola integra, Haldeman, Jour. Phila. A. N. S. VIII, 200 (1842).
Paludina fontinalis, Philippi? see last species.

Fig. 156 is copied from Haldeman's Monograph.

Fig. 157 is a fac-simile of the drawing of its lingual dentition, given by Troschel (Gebiss der Schnecken).

Fig. 157.

Lingual dentition of *Somatogyrus integer*.

Anculotus pumilus, Conrad, which is considered a synonym in Haldeman's *Leptoxis*, is thus described in New Fresh-Water Shells, p. 62. An authentic specimen in the Academy's collection, at Philadelphia, does not appear to be *A. integra*.

Anculotus pumilus.— Shell very small, obliquely oval, blackish; spire consisting of one entire convex whirl; apex eroded; body whirl regularly convex; base with a groove behind the columella, aperture suborbicular, patulous.

Inhabits the Black Warrior River and Bayou Teche; the latter locality was communicated by Prof. Green, who supplied me with a specimen. (*Conrad.*)

This species is nearly allied to, if not identical with *Somatogyrus isogonus*.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9219	2	Ohio. [Pa.	.....	.....
9228	3	Flemington, Centre Co.,	.....	.....

AMNICOLA, Gould & Haldeman.

Jaws present. Lingual dentition of *A. porata:* Rhachidian tooth very short and broad, with a tongue-shaped process from the middle of the anterior surface, reaching beyond the base. Intermediate tooth with a short broad body having a strongly projecting infero-interior angle, and a very long peduncle. Formula of the denticles: $\frac{7}{4+4}$ - 5 - 18 - 30. Shell small, rather

Fig. 158.

Lingual dentition of *Amnicola porata*.—[Stimpson.]

short, ovate or subglobular, thin, smooth, perforate; spire not acute. Aperture broadly ovate, not oblique; outer lip thin and

Fig. 159.

Operculum of *Amnicola.*

sharp, not projecting anteriorly. Operculum corneous. Foot rather short and broad, expanded and broadly rounded behind. Rostrum short. Tentacles cylindrical, blunt at their tips. Verge short, bifid, with a globular base.

Fig. 160.

Animal of *A. lustrica.*

Ova-capsules semi-lenticular in form, with a laminiform limb. Each contains but one egg.

Station, fresh water.

Distribution, North America. (*Stimpson.*)

Amnicola sayana, Anthony.—Shell lengthened, conic, composed of six very convex shining whirls; suture strongly impressed; lines of growth very fine; base with a narrow umbilic; aperture suborbicular; the labium slightly flattened, a small portion of it in contact with the body whirl.

Fig. 161.

Amnicola sayana.

Color bright yellowish-brown, translucent. Inhabits southwestern Ohio.

It is found on wet earth and roots of trees on the margin of a small stream near Cincinnati. (*Haldeman.*)

Cyclostoma cincinnatiensis, Lea, Oct. 1840, Proc. Am. Phil. S. I, 289; 1843, Tr. Am. Phil. Soc. VIII, 229, pl. vi. f. 62.

Amnicola sayana, Haldeman, Mon. p. 19, pl. i, f. 11 (1844?); pt. 4, p. 4 of wrapper (1842); J. A. N. S. Phila. VIII, 200 (1842).—Anthony, Cincin. Shells (1843), no desc.

Paludina sayana, Küster in Chemn. ed. 2, p. 49, pl. ix, f. 30—32.

Chilocyclus cincinnatiensis, Gill, Proc. Phila. Ac. 1863, 34 (no descr.).

Cyclostoma sayana, Jay, Cat. [4], 198 (1852), no descr.; *Amnicola*, p. 278.

Troschel (Gebiss der Schnecken, p. 107, pl. viii, f. 1) figures the lingual membrane of this species, and his figure is copied in my figure 162; No. 8934 of the collection is from Mr. Anthony. No. 8971 is labelled by Mr. Lea "*Cyclostoma cincinnatiensis.*"

Found in Ohio and New York.

This species was first described by Mr. Lea (in Oct. 1840) as a *Cyclostoma*, under the specific name of *cincinnatiensis*. After the true characters of the genus *Amnicola* had been recognized by Gould and Haldeman, it became necessary to include in it this species. It would then have borne the name of *Amnicola cincinnatiensis*, had not the shell published in Jan. 1840, by Mr. Anthony, as *Paludina cincinnatiensis* also been found to belong

to the genus *Amnicola* and become known as *Amnicola cincinnatiensis*. Mr. Anthony's name, having priority of publication,

Fig. 162.

Lingnal dentition of *Amnicola sayana*.—[TROSCHEL.]

was retained. He suggested the substitution of *Amnicola sayana* for Mr. Lea's shell, but never described it. Prof. Haldeman followed his suggestion, giving Mr. Anthony as authority for the new name of *Amnicola sayana*. I have personally consulted the works containing the two descriptions and find the internal evidence supports Prof. Haldeman's view of the priority of Mr. Anthony's name. Dr. Stimpson refers this species to *Pomatiopsis*. If included in that genus it should bear the name of *Pomatiopsis cincinnatiensis*, Lea.

Mr. Lea's description and an enlarged view of the outline of his figure here follow:—

Cyclostoma cincinnatiensis. — Shell elevated in the form of a cone, smooth, shining, transparent, umbilicate; whirls 6, apex obtuse; margin of the lip reflected.

Fig. 163.

Cyclostoma cincinnatiense.

Vicinity of Cincinnati. Diam. .13, length .22 inch.

A small species which has been sent to me several times by my brother, who seems first to have observed it. It is about the size, and nearly the color, of *Paludina limosa*, Say. It is found on wet earth and roots of trees, on the margin of a small stream near Cincinnati. (*Lea.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8966	12	Elyria, O.	W. G. Binney.	.....
8967	10	.....	"	.....
8968	20	Greenwich, N. Y.	Dr. Ingalls.	.....
8969	20+	Little Lakes, N. Y.	Dr. Lewis.	*tennipes*, teste Ingalls.
8970	6	Ohio.	J. G. Anthony.	*Cyclostoma cincinnati-*
8971	2	.....	.....	[*ensis*, teste Lea.
8934	5	Ohio.	J. G. Anthony.	Cabinet series.
9293	5	Otter Tail Creek, Minn.	Kennicott.	.....

Amnicola porata, SAY.—Shell obtusely conic or subglobose; volutions four, convex, obsoletely wrinkled across; spire obtuse; labrum and

labium equally rounded, meeting above in a subacute angle; the upper edge of the latter appressed to the preceding whirl; umbilicus very distinct.

Fig. 164.

Amnicola porata.

Inhabits Cayuga Lake. Cabinet of the Academy.

This species, which was found by Mr. Jessup, is rather larger and more globose than *P. limosa*, to which it is allied, and has a more distinct umbilicus. It resembles *P. decipiens* of Ferussac, but is much less acute, and rather smaller. (*Say.*)

Paludina porata, Say, Journ. Acad. N. Sc. Phila. II, 174 (1821); Binney's ed. p. 69.—Küster in Chemn. ed. 2 p. 63, pl. xii, f. 4, 5.—Philippi *Abbild.* 11, t. II, f. 10 (1846), not Adams (=*lustrica*).

Amnicola porata, Haldeman, Mon. p. 13, pl. i, f. 8 (1844), not of Gould, Inv., Linsley, Prescott, Mighels, Adams, &c. (=*limosa*).—De Kay, N. Y. Moll. p. 88, pl. xxxv, f. 333 (1843).—Chenu, Man. de Conch. II, 308; fig. 2194.

Big Sioux River and Moose Factory are the only other localities of which I have heard.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8976	20+	Big Sioux.	Dr. F. V. Hayden.	.....
8933	..	"	"	Cabinet series.
9025	2	Moose Factory, Br. Am.	C. Drexler.	.....

Amnicola pallida, Hald.—Shell thin in texture, conical, rather robust, composed of four and a half convex whirls, separated by a well marked suture; spire obtuse, rather longer than the aperture; umbilicus narrow; aperture ovate-orbicular, forming an angle posteriorly; a small portion of the labium confluent with the body whirl posteriorly.

Fig. 165.

Amnicola pallida.

Color pale ochraceous, translucent.

Inhabits Lake Champlain.—Prof. Adams.

Intermediate between *lustrica* and *porata*. It is not as short and transverse as the former, which, moreover, is widely umbilicate, and has the aperture regularly rounded posteriorly. According to the description of Professor Adams, the labium sometimes scarcely touches the body of the shell. The spire is comparatively longer than in *porata*, the outline less transverse, and the aperture not orbicular. (*Haldeman.*)

Amnicola pallida, Haldeman, Mon. pt. 4, p. 3 and 4 of wrapper (1842); Mon. p. 12, pl. i, f. 7 (1844?).

Amnicola lustrica, Adams, Thompson's Vermont, 169, 152 (1842), teste Haldeman.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8943	3	Little Lakes, N. Y.	Dr. J Lewis.	Cabinet series.
8974	20+	" "	"	.....

Amnicola limosa, Say.—Shell conic, subumbilicate, dark horn colored, generally incrusted with a blackish irregular covering on the spire, and sometimes on the body, which completely obscures the obsoletely wrinkled epidermis; aperture ovate-orbicular; suture impressed.

Fig. 166.

Amnicola limosa.

Length three-twentieths, breadth one-tenth, of an inch. Cabinet of the Academy.

Animal whitish; head brown; mouth, tentacula, orbits, and vitta on each side of the neck, white; tentacula filiform, more than half as long as the base of the animal; rostrum about half as long as the tentacula, annulate with darker lines above; foot white, brownish above, short, suboval, truncated before, and rounded behind.

Extremely numerous on the muddy shores of the rivers Delaware and Schuylkill, between high and low water marks. (*Say.*)

Paludina limosa, Say, Journ. Ac. Nat. Sc. Phila. I, 125 (1817).—Ib. Nich. Encycl. 3d ed. (1819); Binney's ed. p. 61.—De Kay, N. Y. Moll. 88.

Paludina porata, Adams in Thomp. Hist. of Vt. p. 152 (1842) (teste Hald.).—Philippi, Z. für Mal. II, 77 (1845).

Amnicola porata, Gould, Inv. of Mass. p. 229, f. 157 (1841).

Amnicola limosa, Haldeman, Mon. 10, pl. i, f. 5, 6 (1844?).—Anonymous, Can. Nat. II, 214, fig. (1857).

No. 8960 of the collection is labelled *A. perobtusa* by Dr. James Lewis, but I know of no published description under that name.

From Hudson's Bay and Wisconsin to Virginia.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8953	5	Madison, Wis.	I. A. Lapham.	*lustrica*, teste Lea.
8954	20+	Mohawk, N. Y.	Dr. Lewis.	.....
8955	20+	Burlington, N. J. .	W. G Binney.	.....
8956	12	Washington, D. C.	Dr. E. Foreman.	*porata*, teste Form.
8957	7	Nantucket.	W. Stimpson.	.....
8958	15+	Boston.	"	.....
8959	12+	Milwaukie, Wis.	I. A. Lapham.	.....
8960	20+	New York.	Dr. J. Lewis.	.....
8961	20+	Massachusetts.	W. Stimpson.	.....
8962	50?	Little Lakes, Mich.	Dr. J. Lewis.	.....
8963	9	Elyria, O.	W. G. Binney.	.....
8964	100?	Cambridge, Mass.	Dr. J. Lewis.	*A. porata*, Gould.
8965	2	.....	.....	Teste Lea.
8940	6	Burlington, N. J.	W. G. Binney.	.....
9020	5	Moose Factory.	C. Drexler.	.....

Amnicola decisa, Hald.—Animal dark colored; head blackish, getting lighter posteriorly; tentacles translucent, dark on the edges; an orange-yellow spot at the posterior internal base of the tentacles; foot yellowish, thickly dotted with black above anteriorly; anterior edge nearly as dark as the head; base of the foot thickly dotted with orange on each side of the middle, the dotting being more sparse posteriorly, and entirely wanting anteriorly.

Shell rather short, conical; surface smooth, shining (when the dark foreign matter is removed) lines of growth fine; whirls five, not very convex, sutures impressed, base slightly perforate; aperture dilated, semicircular, labium slightly concave, in contact with the shell posteriorly, and nearly so throughout its length.

Fig. 167.

Amnicola decisa.

Color pale-green, and slightly translucent when the black foreign matter is removed. (See Fig. 160, on p. 81.)

Inhabits small streams connected with the Susquehanna, and has been observed in the Schuylkill by Dr. Griffith.

Allied to *Paludina similis*, Mich., of Europe. A greater portion of the labium lies closer to the shell in this species than in any other here described, except *A. nickliniana*, and *A. tenuipes*, which are slender species. At first view it might be taken for a minute *Paludina decisa*, and I have named it accordingly. In my correspondence I have hitherto called this species *limosa*. (*Haldeman.*)

Amnicola decisa, Haldeman, Mon. p. 7, pl. i, f. 2, 3 (1844?).

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8929	1	District of Columbia.	Dr. E. Foreman.	Cabinet series.
8944	17	.....	.....	.....

Amnicola cincinnatiensis, Anthony.—Shell somewhat ventricose, subumbilicate, color delicately green, whirls four, smooth; spire entire at the apex and prominent; suture deeply impressed; aperture much dilated, approaching to orbicular, nearly half the length of the shell; length one-fifth of an inch.

Fig. 168.

Amnicola cincinnatiensis.

Found in the canal at Cincinnati, clinging to small stones. (*Anthony.*)

Paludina cincinnatiensis, Anthony, Boston J. N. H. III, pt. 1 and 2, p. 279, pl. iii, fig. 3, Jan. 1840.—Küster in *Chemn.* ed. 2, p. 52, pl. x, f. 13, 14.

Amnicola cincinnatiensis, Anthony, List of Cinc. Shells, ed. 2 (1843), no descr.—Haldeman, Mon. p. 9, pl. i, f. 4 (1844?).—De Kay, N. Y. Moll. 88 (1843).

Paludina emarginata, Küster, Ch. ed. 2, p. 50, pl. x, f. 3, 4.

"This is the most robust species hitherto noticed among us,

and is, in form, a miniature representation of *Paludina ponderosa*, except that it is decidedly umbilicated." (*Haldeman.*)

Fig. 169.

Paludina emarginata. (Mag. 5 times.)

Specimens labelled by Mr. Anthony are in the collection of the Smithsonian. Küster's description now follows. His figure is copied in Fig. 169. He quotes *Lymnæus emarginatus*, Say, as a synonym on authority of Bronn.

Paludina emarginata, Küster.—Shell small, narrowly rimate, ovate conic, apex eroded, sub-truncated, shining, thin, delicately striate, dark horn-colored; spire conic, whirls 4, convex; suture deep; aperture ovate; peristome straight, acute, its columellar portion reflected. (*Küster.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9026	3	Ohio.	J. G. Anthony.	.....

Amnicola granum, Say.—Shell conic-ovate; whirls not perceptibly wrinkled, convex; suture deeply impressed; aperture orbicular, hardly angulated above; labium with the superior edge appressed to the surface of the penultimate volution; umbilicus rather small, profound.

Fig. 170.

Amnicola granum. (Mag. 3 times.)

Length less than one-tenth of an inch. Inhabits Pennsylvania.

This very small species is found in plenty in the fish ponds at Harrowgate, crawling on the dead leaves which have fallen to the bottom of the water. It resembles *P. lustrica*, but is a smaller, less elongated shell, and the superior portion of the labium is not an unaltered continuation of the lips as in that shell, but is appressed to the surface of the penultimate whirl in the usual manner of calcareous deposition upon that part. (*Say.*)

Paludina grana, Say, Journ. A. N. Sc. II, 378 (1822); Binney's ed. p. 110.
Amnicola granum, Haldeman, Mon. p. 17 (1844?).—De Kay, N. Y. Moll. 88 (1843).

Ranges from Lake Superior to Virginia.

Fig. 150 is drawn from an authentic specimen given by Mr. Say to the Philadelphia Academy.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8930	2	District of Columbia.	I. Lea.	Cabinet series.

Amnicola parva, Lea.—Shell obtusely conical, rather thin, yellowish, smooth, umbilicate; spire short; suture impressed; whirls four, inflated; aperture large, nearly round.

Springfield, Ohio. Diam. .15, length .18 inch. Fig. 171.

Amnicola parva.

The shell described by Mr. Anthony as *Paludina cincinnatiensis*, resembles this species, but is more elevated in the spire, and is a larger shell. It is more nearly allied to *Amnicola orbiculata*, herein described, but may be distinguished by its being a smaller shell, and being less round in the aperture. The base of the lip is disposed to be slightly angular; the aperture is about one half the length of the shell. (*Lea.*)

Amnicola parva, Lea, Tr. Am. Phil. Soc. IX, 16 (1844); Obs. IV, 16; Proc. II, 34 (1841).—Haldeman, Mon. p. 24 (1844?).

Figure 151 is drawn from Mr. Lea's original specimen.

Amnicola orbiculata, Lea.—Shell orbicular, rather thin, yellowish, smooth, umbilicate; spire short; sutures much impressed; whirls five, inflated; aperture large, round.

Springfield, Ohio. Schuylkill? near Philadelphia. Diam. .18, length .18 inch. Fig. 172.

Amnicola orbiculata.

This species is very nearly allied to *Am. parva*, and may prove to be only a variety of it. The specimens before me are all larger, and they appear to be more globose. The aperture is about half the length of the shell. I found a single specimen of this species among many small shells which were thrown together in a box, as being collected from our vicinity. It may be possible it is an Ohio specimen gotten by mistake into the box. Found also in Cayuga Lake. (*Lea.*)

Amnicola orbiculata, Lea, Tr. Am. Phil. Soc. IX, 16 (1844); Obs. IV, 16; Proc. II, 34 (1841).—Haldeman, Mon. p. 24 (1844?).

Figure 153 is drawn from Mr. Lea's original specimen.

Amnicola longinqua, Gould.—Shell small, elongate-ovate, smooth; apex obtuse; whirls 5, rounded; suture deep; aperture elliptical, rounded posteriorly; columella very arcuate, subperforate. Length one-eighth, breadth one-tenth inch. Fig. 173.

Amnicola longinqua.

Found in the Colorado Desert (Cienaga Grande) by W. P. Blake.

In form it is much like *A. cincinnatiensis*, Hald., or like *A. galbana*, or like miniature specimens of *Paludina ponderosa*. It has a bleached or chalky color, probably from exposure, like the

other species found on the Cienaga Grande, a region which is immersed a portion of the time, and dry the remainder, and was once, apparently, an extensive marsh, or shallow lake. (*Gould.*)

Amnicola longinqua, GOULD, Pr. Bost. S. N. H. V, 130 (Mar. 1855); P. R. R. Report, V, 333, pl. xi, fig. 10, 11 (1857); Prelim. Rep. App. 24 (1855); Otia, 217.

Fig. 173 is a fac-simile of the original figures referred to.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9220	5	Colorado Desert.	Blake.	Type.

DOUBTFUL AND SPURIOUS SPECIES OF AMNICOLA.

Amnicola integra, SAY of ANTHONY'S List of Cincinnati Shells is *Somatogyrus integer.*

Amnicola gracilis, GOULD, mentioned by name only, from Hot Springs, Va. Pr. A. N. S. Phil. II, 167. The New Zealand species of this name is the same as *Amnicola egena*, GLD., vide Otia, p. 245.

Amnicola elongata, JAY, Cat. [4] 278, Virginia; no descr.

Amnicola seminalis, COOPER, P. R. R. Rep. XII, pt. 2, p. 374. *Vide Fluminicola nuttalliana.*

Amnicola nuttalliana, COOPER, (*l. c.*), p. 374. *Vide Fluminicola nuttalliana.*

The following are mentioned by name only in WHEATLEY'S Cat. of U. S. Shells. No description of them was ever published.

Amnicola albilabris, WARD, Ohio.
Amnicola dentata, SAY, Florida.
Amnicola gibbosa, ANTH.
Amnicola sayana, LEA, Ohio.
Amnicola pallida, LEA. See *Somatogyrus isogonus.*

FOSSIL SPECIES OF AMNICOLA.

Amnicola galbana, HALD.—Shell conical, smooth, shining, composed of four and a half not very convex whirls, having the lines of growth very fine; base with a narrow umbilic; aperture nearly circular, slightly produced in an angle posteriorly; labium slightly thickened; a small portion of it, which is rectilinear, in slight contact with the body whirl.

Fig. 174.

Amnicola galbana.

Color . . . bleached and chalky.

Occurs fossil in the fresh water newest tertiary deposit in Sussex County, New Jersey. (*Haldeman.*)

Amnicola galbana, HALDEMAN, Mon. p. 15, pl. i, f. 9 (1844?); pt. 4, p. 4 of wrapper (1842).

FLUMINICOLA, Stimpson.

Lingual dentition of the type: Rhachidian tooth more than twice as broad as long. Outer lateral teeth with a smaller number of denticles than the inner. Formula of the denticles: $\frac{5}{3+3}$ - 6 - 10 - 7.

Fig. 175.

Lingual dentition of *Fluminicola nuttalliana.*

Shell comparatively large, obliquely ovate, thick, smooth, imperforate; spire moderate, obtuse. Aperture ovate; inner lip flattened, callous; outer lip effuse and projecting anteriorly, so that the peritreme is not continuously in the same plane. Operculum corneous. Tentacles tapering. Rostrum rather large. Foot broad. Verge large, compressed, with a broad semicircular lamiuiform expansion or wing on its left side. Ova-capsules large, circular, depressed, almost discoidal, each containing a large number of eggs.

Station, fresh water.

Distribution, Oregon and California. (*Stimpson.*)

Fluminicola nuttalliana, Lea. — Shell subglobose, horn-colored, smooth; sutures rather impressed; whirls 4; aperture white, nearly round.

Fig. 176.

Paludina nuttalliana.

Wahlamat, near its junction with the Columbia River: Prof. Nuttall. My cabinet; cabinet of Prof. Nuttall. Diam. .3, length .4 inch.

There is a very close resemblance between this species and *P. nuclea* (herein described). It is, however, less oblique, larger and less elevated in the spire. (*Lea.*)

Paludina nuttalliana, Lea, Tr. Am. Phil. Soc. VI, 101, pl. xxiii, f. 109 (1839); Obs. II, 101.

Amnicola nuttalliana, Cooper, P. R. R. Rep. p. 374 (no descr.) (1859).

Paludina seminalis, Hinds, Voy. of the Sulphur, p. 59, pl. xvi, f. 22

(1844); Arch. f. Nat. 1843, II, 130; Annals Nat. Hist. X, 83, pl. vi, f. 8.

?Leptoxis nuttalliana, Haldeman, Mon. Lept. 6, pl. v, f. 156 (1847?).
Anculotus nuttallii, Reeve, Con. Icon. 46 (1861) (excl. syn. *A. fuscus*).
Bithynia seminalis, Carpenter, Brit. Ass. Ad. Sc. 1857, 326, no descr.
Amnicola seminalis, Cooper, P. R. R. Rep. XII, 374 (1859), no descr.
Amnicola hindsi, Baird, Pr. Zool. Soc. Lond. 1863, 67.

A very common species through Oregon and California. It was originally described and figured (as copied above) under the name of *Paludina*, and has since been referred to the genera *Amnicola*, *Bithynia*, and *Leptoxis*. Its outward features are most closely allied to those of the last mentioned genus. I should have considered it a *Leptoxis* had not Dr. Stimpson discovered its true characters. From the other genera to which it has been referred it is readily distinguished by its horny subspiral operculum and thick shell.

Fig. 177.

Fluminicola nuttalliana, enlarged.

I have seen no authentic specimen of *Paludina seminalis*, but have no doubt of No. 9212 and 9213 of the collection being referable to it. The original description and figure are copied below. It is from them I am induced to place it in the synonymy of *nuttalliana*, as done by Haldeman.

Fig. 178.

Pal. seminalis.

Paludina seminalis, Hinds.—Shell obtusely turreted, solid, horn colored, smooth; apex eroded; whirls 4; aperture bluish, expanded.

River Sacramento, California.

Distinguished from *P. nuclea*, Lea, which is from a neighboring locality, by its somewhat smaller size, bluish instead of white mouth, having one whirl less, the aperture more expanded, and absence of the black lines round the mouth, which when present is so good a character in his shell, but which, in any numerous specimens of it, I do not find at all constant, and usually only to be seen in those better developed. *Anodon angulatus* is also found abundant in this river, &c. (*Hinds.*)

I have not seen an authentic specimen of *Amnicola hindsi*. By the kindness of Mr. Carpenter I am able to give a translation of the original description and copy of the original figures. The latter will be published in the Report of the British N. A. Boundary Commission. The species seems to me identical with *Fluminicola nuttalliana*.

Amnicola hindsi, Baird.—Shell obtuse, rather solid, greenish-olive, with delicate longitudinal wavy striæ and ill-defined transverse furrows; apex eroded; whirls four, the last one bluntly carinated near the middle, channelled at the impressed sutures; columella white; aperture bluish.

Fig. 179.

Amnicola hindsi.

River Kootanie and stream at foot of Rocky Mountains, British Columbia.

Differs from *Paludina seminalis*, Hinds, in contour, being bluntly carinate round the middle of the last whirl, and in being channelled round the suture. The surface of the shell is distinctly marked with numerous flexuose striæ, the lines of growth, and near the sutures is rather indistinctly marked with circular striæ. (*Baird.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9211	6	Columbia Riv.[ville, Or.	Dr. Cooper.	.....
9226	1	Rogue's R., Jackson-	.....	.....
9227	30+	Upper des Chutes R., Or.	Newberry.	.....
9230	13	" "	"	.....
9231	3	Willamette River, Or.	"	.....
9232	20+	Canoe Creek, Cal.	"	.....
9233	6	Pitt River, Cal.	"	.....
9234	11	E. br. of Klamath R., Or.	"	.....
9302	3	California.	"	Type, Fig. 177.
9212	5	Oregon and W. T.	"	*Pal. seminalis.*
9213	2	"	"	.....

Fluminicola virens, Lea.—Shell oblique, thick, somewhat granose, green; whirls rather inflated; aperture ovate.

Wahlamat, near its junction with the Columbia River: Prof. Nuttall. My cabinet; cabinet of Prof. Nuttall. Diam. .2, length .4 inch.

Fig. 180.

Paludina virens.

The apices of all the specimens which Prof. Nuttall gave me are destroyed, so that it is impossible to give some of the characters of this species. It is remarkably solid for so small a species. (*Lea.*)

Paludina virens, Lea, Tr. Am. Phil. Soc. VI, 91, pl. xxiii, f. 93 (1839); Obs. II, 93.

Fig. 181.

Leptoxis virens, Haldeman, Lept. 5, pl. v, f. 147–150 (1847?). See my Fig. 181.

Leptoxis virens.

Paludina nuclea, Lea (*l. c.*), VI, 91, pl. xxiii, f. 103 (1839); Obs. II, 91.

Haldeman, *l. c.*, places doubtfully in the synonymy *Pal. nuclea*, Lea, of which the original description and figure are given below.

Paludina nuclea, Lea.—Shell obtusely turreted, solid, horn-color, smooth; sutures impressed; whirls 5; aperture white, oval.

Fig. 182.

Pal. nuclea.

Wahlamat, near its junction with the Columbia River. Prof. Nuttall. My cabinet. Cabinet of Prof. Nuttall. Diameter .2, length .4 inch.

This is a small, solid species, and is more oblique than *P. decisa*, Say. Like it, the apex is usually cut off. Round the mouth there is a black border, which contrasts with the pale horn-colored epidermis. (*Lea.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9225	2	Willamette River, Or.	.....	.....

Fluminicola fusca, HALDEMAN.—Shell subglobose, conic, smooth; spire loosened, with excoriated apex. Whirls subangular, forming posteriorly a slight projection on account of the labium turning abruptly at the suture, which is thus made conspicuous. Aperture rounded, posteriorly produced into a moderate angle. Columella thickened, somewhat concave, scarcely emarginate. Peritreme nearly uniform. Color reddish, labrum white.

Fig. 183.

Leptoxis. fusca.

Fig. 184.

Leptoxis fusca.

Inhabits Oregon Territory.

Somewhat resembles the preceding (*L. pisum*), but easily distinguished by the straighter labium and want of columellar emargination. In Fig. 84 the lines of growth are heavier, and a disposition is seen to form encircling striæ. (*Haldeman.*)

Fig. 185.

Leptoxis fusca.

Leptoxis fusca, HALDEMAN, Mon. Lept. 4, pl. iii, iv, f. 83, 84 (1847?).

To this species, of which the original description and figures are given above, I refer numerous specimens from Utah, Oregon, &c., in the collection.

Reeve quotes this species as *Anculotus fuscus* in the synonymy of *Anc. nuttalli.*

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9221	4	Head of Green R., Utah.	Malloney.	.....
9222	6	Shores of Lake Utah.	Capt. Burton.	.....

POMATIOPSIS, Tryon.

Jaws like those of *Amnicola*, though smaller. Lingual membrane with numerous rows of 3, 1, 3 teeth; centrals small, broader at base, cusp recurved and tridentate, base with two obtuse denticles; laterals longer than broad, cusp recurved and denticulate, the inner lateral much broader than the two outer ones.

Fig. 186.

Lingual dentition of *Pomatiopsis lapidaria*.—[Stimpson.]

Tentacles short, subulate, pointed, rostrum large, longer than the tentacles. Foot broad. Verge very large, flattened, broad, convoluted in a spiral coil of one and a half turns. Ova capsules —? Shell small, thin, smooth, long, subumbilicate. Spire turreted. Aperture ovate, peritreme reflected. Operculum corneous.

Eastern North America.

Terrestrial.

Fig. 187.

Animal of *P. lapidaria*, enlarged.

Pomatiopsis lapidaria, Say.—Shell turreted, subumbilicate, with six volutions, which are obsoletely wrinkled across. Suture impressed. Aperture longitudinally ovate-orbicular, operculated, rather more than one-third of the length of the shell.

Fig. 188.

Pomatiopsis lapidaria.

Length about one-fifth of an inch. Collection of the Academy of Natural Sciences.

Inhabitant not so long as the shell, pale; head elongated into a rostrum as long as the tentacula, and emarginate at tip; tentacula two, filiform, acuminated at tip, short; eyes prominent, situated at the external or

posterior base of the tentacula; base or foot of the animal dilated, oval, obtuse before and behind.

Found under stones, &c., in moist situations, on the margins of rivers. Like those of the genera *Lymnæa* and *Planorbis*, this animal possesses the faculty of crawling on the surface of the water, in a reversed position, the shell downward. (*Say.*)

Cyclostoma lapidaria, Say, Journ. A. N. S. Phila. I, 13 (1817); Binney's ed. 59.

Amnicola lapidaria, Haldeman, Mon. p. 18, pl. i, f. 10 (1844?); Jour. A. N. S. Phila. VIII, 200 (1842).

Paludina lapidaria, Say, Nich. Ency. 3d ed. (1819); Binney's ed., p. 56. —Küster in Chemn., ed. 2, p. 54, pl. x, f. 21, 22.—DeKay, N. Y. Moll. 86 (1843).

Melania lapidaria, Lewis, Bost. Proc. VIII, 255; Phila. Pr. 1862, 290 (no descr.).

Pomatiopsis lapidaria, Tryon, Proc. Phila. Acad. 1862, 452 (no descr.).

This is a widely distributed species, ranging at least from Georgia to New York, and from Missouri to Michigan. It is also found in the postpleiocene of the Mississippi River bluffs.

I have already given a figure of the animal and lingual dentition (Figs. 186 and 187).

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8945	9	North Georgia.	A. Gerhardt.	.....
8946	9	Ohio?	J. G. Anthony.	.....
8947	8	Dist. of Columbia.	Dr. E. Foreman.	.....
8948	25+	.....	.....	.....
8949	20+	Ann Arbor, Mich.	W. G. Binney.	.....
8950	6	St. Louis.	"	Post-pleiocene?
8951	10+	New York.	Dr. J. Lewis	.....
8952	20+	Elyria, O.	W. G. Binney.	.....
8935	3	New York.	Dr. J. Lewis.	Cabinet series.

Pomatiopsis lustrica, Say.—Shell conic; whirls slightly wrinkled, convex; suture profoundly indented; aperture oval, nearly orbicular; labrum with the superior edge not appressed to the preceding whirl, but simply touching it; umbilicus rather large, rounded.

Fig. 189.

Pomatiopsis lustrica.

Length, less than one-tenth of an inch. Cabinet of the Academy.

The smallest species I have seen. The aperture somewhat resembles that of a *Valvata*, to which genus it may probably be referable. Mr. Jessup obtained two specimens on the shore of Cayuga Lake. (*Say.*)

Paludina lustrica, Say, Journ. A. N. S. Phila. II, 175 (1821); Binney's

ed. p. 69.—Küster in Chemn. ed. 2, p. 63, pl. xii, f. 6, 7, not of Adams (= *pallida*).

Amnicola lustrica, Haldeman, Mon. p. 16 (1844).—DeKay, N. Y. Moll. 87 (1843).

Found also in Wisconsin and British America.

Fig. 189 is drawn from an authentic specimen given by Mr. Say to the Philadelphia Academy.

Cat. No.	No. of Sp	Locality.	From whom received.	Remarks.
8975	20+	Mohawk River, N. Y.	Dr. Lewis.	.....
8939	..	"	"	Cabinet series.
8977	2	Four Lakes, Wis.	I. A. Lapham.	.....
9019	3	Moose Factory.	C. Drexler.	.....

Family CYCLOPHORIDÆ.

Lingual membrane narrow, with seven rows of recurved, hooked teeth. Head proboscidiform; tentacles subulate; eyes on the outer side of the base of the tentacles. Foot elongated. Operculum distinctly spiral, testaceous, cartilaginous or horny; whirls very numerous and sub-equal, or few and rapidly increasing. Shell usually covered with a horny epidermis; aperture, for the most part, circular.

Subfamily CYCLOSTOMINÆ.

Operculum ovate, rarely subcircular, composed of a few gradually increasing whirls; nucleus somewhat excentrical.

CHONDROPOMA, Pfr.

Animal short, tentacles slender, enlarged at tips; eyes prominent, situated on a tubercle at the external base of the tentacles. Proboscis bifurcate. Operculum oval, subcartilaginous, flat, with few, rapidly increasing whirls, and a nucleus generally very excentric. Shell oblong-turreted, generally truncated at tip, more rarely globosely conic; aperture oval;

Fig. 190.

Animal of *C. dentatum*.

Fig. 191.

Operculum of *C. dentatum*.

peristome simple, or more or less thickened, somewhat straight, rather expanded or broadly reflected.

Chondropoma dentatum, Say.—Shell conic cylindrical, or turreted, truncate at tip, the surface finely cancellate with raised, longitudinal, and revolving lines; color varying from yellowish to brown, usually with darker brown bands, which are generally interrupted in such a manner that the colors also form longitudinal stripes; whirls, when complete, seven; but the three uppermost are usually lost; they are rounded, and separated by a deep, crenulated suture; aperture rounded ovate, a little angular posteriorly; peristome a little reflexed, white; base with a minute perforation. Length 12, breadth 4 mill.

Fig. 192.

Chondropoma dentatum.

Cyclostoma dentatum, Say, Journ. Phila. Ac. V, 125: Binney's ed. 29.—DeKay, N. Y. Moll. 82.—Binney, Terr. Moll. II, 348, pl. lxii.
Chondropoma dentatum, Pfeiffer, Mon. Pneum. Viv. 1, 286; II, 140; Mal. Blatt. 1856, 132.—Gray & Pfeiffer, Brit. Mus. Cat. Phan. 203.—W. G. Binney, Terr. Moll. IV, 91, pl. lxxv, f. 24.

Key West: Fort Dallas, Florida.

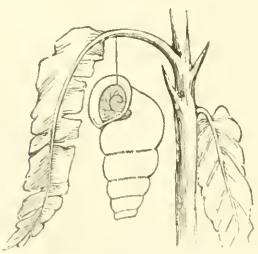
Animal (see Fig. 190): Body very short, pale, tentacles darker, slender, somewhat enlarged at tips; eyes black, prominent, situated on a tubercle at the external base of the tentacles. Proboscis bifurcate, the two points serving the purpose of buccal tentacles. Operculum horny, the spiral of about two and a half turns.

Fig. 193.

Operculum of *C. dentatum.*

The shell is carried somewhat laterally, and very little elevated. The motions of the animal are very rapid; the locomotive disk contracts in an undulatory manner; and when the animal has advanced so that the shell drags along by its side, by a sudden contraction of the neck the tip of the shell is suddenly jerked forward, so as to bring the shell at right angles with it; and this movement, in a quarter of a circle, is very rapidly performed. As the operculum prevents the animal, when at rest and retired within its shell, from adhering by means of its foot, as is usual with the *Helicidæ*, the animal has the power of spinning

Fig. 194.



C. dentatum at rest, enlarged.

a short thread, which is attached to the object of support; and by this it hangs suspended at pleasure.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8534	7	Florida.	W. G. Binney.	Cabinet series.

Spurious Species of Cyclophoridæ.

Cyclostoma cincinnatiensis, Lea, not Anthony & DeKay; is an *Amnicola*, and *C. lapidaria*, Say, Linsley, and Kirtland, is a species of *Pomatiopsis*, q. v.

Cyclostoma marginalis, Kirtland (Ohio Rep.), and *C. marginata*, Say, are species of *Pupa*, q. v.

Cyclostoma tricarinata, Say, is a *Valvata*.

Ctenopoma rugulosum, Pfeiffer, may, perhaps, prove an inhabitant of Florida. A single specimen found there is here figured.

Fig. 195.

Ctenopoma rugulosum.

Family TRUNCATELLIDÆ.

Lingual membrane with seven rows of recurved, hooked teeth. Animal with a broad, produced, bilobed muzzle, tentacles flattened, sub-triangular, eyes sessile on the middle of their upper bases. Foot very short and rounded. Operculum horny, subspiral. Shell lengthened, truncated, with a rounded aperture.

TRUNCATELLA, Risso.

Animal with a small foot, against the end of which rests the operculum when the animal is withdrawn; the tentacles are short, acute; the snout is extended beyond them as much as the whole length of the animal. The shell is carried horizontally. Operculum horny, hardly spiral, with a basal nucleus. Shell imperforate, but with an umbilical groove, cylindrical, turreted, usually pellucid and smooth, of a reddish horn-color; the upper whirls

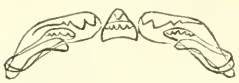
Fig. 196.

Animal of *Truncatella.*

are also truncated in the adult, the remaining ones are usually gradually increasing in size, and covered with more or less strongly developed ribs; the peristome is simple or double, sometimes reflected; the base is generally furnished with a prominent carina or ridge, formed by the peristome. Aperture rounded.

Dr. Gray describes *Truncatella* with distinct white jaws.

Fig. 197.



Lingual dentition of *Truncatella caribæensis*.—[TROSCHEL.]

The teeth of *T. caribæensis*, by Troschel: Central rather narrow, conical, apex recurved; first lateral very broad, apex recurved, denticulate; second lateral narrower, denticulated; outer lateral narrow, simple.

Truncatella caribæensis, SOWB.—Shell subrimate, subcylindrical, rather solid, in its truncated state but slightly decreasing in size towards the apex, reddish, or dark amber-colored, with delicate ribs, which are but little curved, and often hardly perceptible on the middle of the whirls; suture slight; whirls not truncated, three or four, distinctly increasing in size, equally convex, the last often smooth, slightly carinated on its base; aperture subvertical, ovally elliptic, angular above; peristome continuous, straight, thickened at its connection with the penultimate whirl. Length 7–8, diameter 3 millimetres; length of aperture 2½ millimetres.

Fig. 198.

Truncatella caribæensis, enlarged.

Truncatella caribæensis, SOWERBY MSS.—REEVE, Conch. Syst. II, t. clxxxii, f. 7.—PFEIFFER in Zeitsch. f. Mal. 1846, 182; Mon. Auric. Viv. II, 185; Mon. Phan. Viv. II, 7; Brit. Mus. Cat. 134.—W. G. BINNEY, T. M. IV, 185, pl. lxxv, f. 2, 4.—CHEMNITZ, ed. 2; Auric. p. 9, pl. i, f. 35, 36; pl. ii, f. 22; not pl. ii, f. 2–4.

Truncatella gouldii, ADAMS, ined.

Truncatella succinea, ADAMS, Proc. Bost. Soc. 1845, 12.

Florida Keys, Mexico, Alabama; also Cuba and Jamaica.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8534	3	Florida.	W. G. Binney.	Cabinet series.

Truncatella bilabiata, Pfr. — Shell subrimate, cylindrical, elegant, solid, opaque, brownish; ribs subarcuate, elevated, obtuse, at equal distances; suture deep and simple; remaining whirls 4½ to 5, convex, the last scarcely longer than the others, heavy and subcompressed at base; aperture vertical, oval, scarcely angular above; peristome double, the outer one white, heavy, and terminating in the basal ridge or carina, the inner one continuous. Length 5½, breadth 1¾; length of aperture 1½ millimetres.

Fig. 199.

Truncatella bilabiata, enlarged.

Truncatella bilabiata, Pfeiffer in Wiegm. Arch. 1840, I, 253; in Zeit. f. Mal. 1846, 187; Mon. Auric. Viv. 192; Mon. Pneum. Viv. II, 8; Brit. Mus. Cat. 140.—W. G. Binney, T. M. IV, 188, pl. lxxv, f. 3, 7.—Chemnitz, ed. 2, p. 7, pl. i, f. 27–31.

Florida, Cuba, Carmen Island.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8532	3	Florida.	W. G. Binney.	Cabinet series.

Truncatella pulchella, Pfr.—Shell subrimate, oblongly subcylindrical, light, reddish horn-color or amber, shining, pellucid, lightly ribbed; ribs scarcely elevated, thread-like, at irregular intervals, often more distinct at the moderate suture; remaining whirls 4 to 4½, rather convex, gradually increasing in size, the last generally smooth below the middle, compressly carinated at its base; aperture subvertical, obliquely elliptical, enlarging at base; peristome simple, continuous, somewhat expanding, and furnished with a slight ridge at its right extremity. Length 4½–5, of aperture 1⅔ mill.

Fig. 200.

Truncatella pulchella, enlarged.

Truncatella pulchella, Pfeiffer in Wiegm. Arch. 1839, I, 356; in Zeitsch. f. Mal. 1846, 186; in Mon. Auric. Viv. 192; Mon. Pneum. Viv. II, 8; Brit. Mus. 140. —W. G. Binney, T. M. IV, 189, pl. lxxv, f. 1, 9, 10. —Chemnitz, ed. 2, Auric. 10, pl. ii, f. 11–15.

Florida. Also a West Indian species.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8533	2	Florida.	W. G. Binney.	Cabinet series.

Truncatella subcylindrica, Gray.—Shell scarcely rimate, cylindrical, furnished with regular, crowded ribs, less prominent or obsolete at the suture, shining, pellucid, yellowish horn-color or hyaline; remaining whirls four, rather convex, flattened in the middle, regularly increasing, the last not ridged on the base; aperture vertical, ample, angularly oval, sub-effuse at base; peristome lightly thickened, its external margin sub-produced, the columellar portion briefly reflected, appressed and above thickened. Length 5, breadth 2 mill.

Fig. 201.

Truncatella subcylindrica, enlarged.

Helix subcylindrica, Pulteney, Cat. Dorsetsh. 49.—Montagu, Test. Br. II, 393.

Truncatella subcylindrica, Gray in Turton's Man. 22, f. 6.—Shuttleworth, Diagn. 7, 154.—Pfeiffer, Mon. Auric. Viv. 187; Mon. Phan. Viv. II, 7; Br. Mus. Cat. 136.—W. G. Binney, T. M. IV, 186, pl. lxxv, f. 5, 6, 8.—Orbigny, Moll. Cub. II, 5 (excl. *T. truncatula*).

Truncatella truncatula, Lowe in Zool. Proc. 1845, 217?; in Zool. Journ. V, p. 299, tab. xiii, f. 13–18?

Truncatella caribæensis, Pfeiffer in Zeitsch. f. Mal. 1846, 182, ex parte.—Küster in Chemn. ed. 2, Auric. pl. ii, f. 1–4.

A West Indian species found on the Florida Keys.

Truncatella californica, Pfr.—Shell not rimate, cylindrical, truncated at tip, thin and translucent with light striæ, shining, amber-colored; spire in the perfect state of the shell composed of about ten whirls, of which four only are not deciduous; these are convex, increasing in size rather rapidly; aperture oval, vertical, rounded above; peristome simple and continuous, slightly expanded, its pillar margin scarcely attached to the shell. Length $4\frac{2}{3}$, diam. $1\frac{2}{3}$ mill.

Fig. 202.

Truncatella californica, enlarged.

Truncatella californica, Pfeiffer, Proc. Zool. Soc. London, May, 1857, 111; Mon. Pneum. Viv. II, 7.—W. G. Binney, T. M. U. S. IV, 28, pl. lxxix, f. 20, 22.

Truncatella gracilenta, Gould, Proc. Phila. Ac. Nat. Sc. X, 1858, errata.

San Diego, California.

Family NERITIDÆ.

Jaws two, above and below, with denticulated margins. Lingual dentition very similar to that of the *Trochidæ;* the central teeth few, the lateral hooks, or uncinæ, very numer-

ous. Head with a broad, short muzzle; tentacles slender and subulate, with the eyes on stout peduncles at their outer

Fig. 203.

Lingual dentition of *Neritella reclivata.*

bases; no head-lobes or neck-lappets. Foot oblong, triangular, the sides simple, without filaments, or lateral membrane. Operculum articulated, shelly, subspiral. Shell depressed or oval, not umbilicated; spire very short, cavity simple from the absorption of the internal portions of the whirls; aperture semiovate, not pearly within.

In this tribe of Scutibranchiate mollusks the sides of the foot are without membranaceous fringes and tentacular filaments; the animal is not voluminous, and the foot is small and never envelops the shell; in their dental system they resemble the *Trochidæ,* as also in their muzzle-shaped heads and pedunculated eyes. They are littoral animals, inhabiting the stones and rocks along the shore, feeding on the algæ that abound in that situation. They appear to be more active during the night, resembling in this respect, the *Patellidæ,* which are said to enjoy considerable locomotive powers at that time.

There are several genera included in this family which are not fluviatile, and therefore not noticed by me. Such are *Nerita, Clithon,* and *Catillus.* The genus *Neritella* alone is referred to.

NERITELLA, Humphrey.

Operculum testaceous, the outer surface smooth, with two apophyses, the upper shorter, sometimes dilated and crested, the lateral in the form of an arched rib. Shell globose, oval, turriculated or conical, thin, often depressed, covered with a horny epidermis; aperture semilunar; inner

Fig. 204.

Operculum of *Neritella reclivata.*

lip straight, flattened, the margin smooth or denticulated; outer lip simple internally.

The *Neritellæ* are tolerably numerous in species; they are inhabitants of fresh water, and are usually covered with an epidermis; some among them are found crawling on the stones in shallow water; others live in deeper water, half buried in the mud, some in brackish and others even in salt water; some are amphibious, clinging to the roots of Nipah palms and other trees on the margins of rivers, while a few inhabit the foliage of tall trees that overhang ponds and rivulets. The genus *Neritella*, as restricted, is characterized by the shell being transverse, elliptical or hemispherical; the spire lateral or none; the inner lip septiform, flattened and striolate, with the margin finely denticulate; with one or two exceptions they are not found in the frigid or temperate zones, but are extensively distributed in every other part of the world.

I adopt the name *Neritella*, instead of *Neritina*, on account of its having precedence. I presume a description was published by Humphreys, but do not have access to a copy of the Museum Colonnianum. *Neritella* is generally preferred in the more recent works on Conchology.

The genus *Neritella*, as restricted by Messrs. Adams, contains no North American species. The following are the subgenera proposed by them, with the American species quoted in each :—

Subgenus **Neritina**, Sw. (*Clithon*, Recluz).—Shell globular, oval or turriculated, smooth or spirally striated, often adorned with vivid and varied colors; inner lip septiform, crenulated, rarely simple.

N. cassiculum. | *N. sayana.*
N. reclivata. |

Subgenus **Vitta**, Klein (*Theodoxus*, Montf.; *Elea*, Ziegl.).—Shell transverse, smooth or nearly smooth; spire lateral, inclined over the aperture, more or less prominent; inner lip usually flat, with the margin simple or denticulated; operculum uniform, without colored zones.

N. jayana. | *N. picta.*

Subgenus **Dostia**, Gray (*Sandaliformes*, *Mitrula*, Mke.).—Shell slipper-shaped, solid; apex entirely posterior, rolled in a half turn on the

side ; peritreme continuous and free ; inner lip septiform, the margin united to the inner portion of the peritreme, slightly arched in the centre, and denticulated.

(No American species.)

Subgenus **Alima**, Recluz.—Shell depressed, suborbicular, with the upper extremity of the outer margin prolonged into a lateral wing ; spire subposterior and lateral ; inner lip septiform, margin finely denticulate.

(No American species.)

Subgenus **Neripteron**, Lesson.—Shell catilliform, with the two extremities of the outer margin prolonged into lateral auricles ; spire subposterior and lateral ; inner lip septiform ; margin finely denticulate.

(No American species.)

Neritella reclivata, Say. — Shell thick, strong, globose-oval, greenish-olive, with numerous approximate, parallel, irregularly undulated green lines across the volutions ; volutions about three, the exterior one occupying nearly the whole shell ; spire very short, obtuse at the apex, and frequently eroded to a level with the superior edge of the body whirl ; mouth within bluish-white ; labrum acutely edged ; labium callous, minutely crenated on the edge, and with a small tooth near the middle. Greatest diameter nineteen-twentieths of an inch ; greatest transverse diameter four-fifths of an inch.

Fig. 205.

Neritella reclivata.

Fig. 206.

Operculum of *Neritella reclivata.*

Inhabits East Florida. Cabinet of the Academy and Philadelphia Museum.

Animal pale or less distinctly lineated, or clouded with black ; foot rounded, almost orbicular, hardly as long as the shell is broad ; above with four more or less distinct, black, parallel lines ; rostrum dilated, truncated, tip with four black lines, a black band connecting the eyes ; eyes prominent, appearing to be placed on a tubercle at the outer base of the tentacula, black, with a white orbit ; tentacula with darker or black lines, setaceous, and longer than the breadth of the rostrum ; beneath immaculate.

I found this species in great plenty, inhabiting St. John's River in East Florida, from its mouth to Fort Picolata, a distance of a hundred miles, where the water was potable. It seemed to exist equally well where the water was salt as that of the ocean, and where the intermixture of that condiment could not be detected by the taste. Its movements are remarkably slow. (*Say.*)

Theodoxus reclivatus, Say, Journ. A. N. Sc. Phila. II, 257; Binney's ed. 87.
Neritina reclivata, Reeve, Con. Icon. 34 *a*, *b*, Oct. 1855.
Neritina floridana, Shuttleworth in Reeve, Con. Icon. 85 *a*? Nov. 1855.

Fig. 207 represents the lingual dentition of this species, from a

Fig. 207.

Lingual dentition of *Neritella reclivata*.

specimen presented the Smithsonian Institution by Prof. Agassiz. The lingual plate is composed of 48 rows; median tooth small, slightly tridentate; first lateral large, trapeziform; second and third lateral minute, simple; uncini 18 or 19, first large, marked with one large denticle, flanked by ten minute denticles; the rest close set, long, slender, recurved, and blunt at ends.

Reeve quotes it from Mexico.

I have seen no authentic specimen of *Neritina floridana*, Shuttl., placing it in the synonymy after a study of Reeve's description and figure, which are copied below.

Neritina floridana.—Shell compressly-globose, rather solid, spire obtuse, whirls rather flattened at the upper part, columellar area callous; greenish-white, densely elegantly painted with very fine olive lines.

Fig. 208.

Neritina floridana.

Neritina floridana, Shuttleworth MS. in Museum Cuming.

Florida. Closely allied to *Neritina reclivata*, from which it scarcely differs, except in being of a more stunted growth. (*Reeve.*)

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9299	1	Florida.	L. Agassiz.	Fig. 207.
9307	..	"	"	Fig. 208.

Neritella californica, Reeve.—Shell ovate, rather thin, concave beneath, spire rather narrowly produced, obtusely flattened at the apex, whirls smooth, aperture expanded, columellar area concavely flattened,

rather broad; black, blue within, columellar area deep blood-stained.

Gulf of California. This appears to be distinct from any of its congeners in form, while the deep-toned coloring is characteristic. (*Reeve.*)

Neritina californica, REEVE, Con. Icon. 20, *a*, *b* (Oct. 1855).

Fig. 209.

Neritina californica.

I have seen no authentic specimen of this species, the original description and figure of which are given above.

Neritella cassiculum, SOWERBY.—Of a globose form, slightly inclining to oval, with an olive-green epidermis, under which may be seen numerous black lines, angulated so as to leave white, triangular spots, which are larger in three bands across the shell; spire obtuse, consisting of four whirls; aperture semicircular, with the outer lip slightly thickened and the columella inclining to orange, narrow, swelled, and minutely crenulated on its nearly straight edge. Locality unknown. (*Sowerby.*)

Neritina cassiculum, SOWERBY, Conch. Ill. f. 55; Thes. Conch. 521, pl. cvi, f. 194.—CARPENTER, Maz. Shells (1858), 258; Brit. Mus. Rep. pl. ix, f. 5 (1857).

Fig. 210.

Neritina cassiculum.

Carpenter quotes this species from Mazatlan. I have seen no specimen, but give above the original description and figure.

Neritella picta, SOWERBY.—Subglobose, grayish, variously painted, with black lines or reticulations and whitish spots. There is a peculiar enamel-like appearance about the external surface; the columella is invariably of a chestnut color, rather swelled, and obscurely crenulated at the margin.

Panama, on a mud bank, partially overflowed with fresh water: Cuming. (*Sowerby.*)

Neritina picta, SOWERBY, Pr. Zool. Soc. 1832, 201; Illustr. pl. lxxxvi, f. 1; Thes. Conch. 530, pl. cxvi, f. 267–9. —REEVE, Con. Icon. 101.—DESHAYES in LAMARCK, VIII, 588.—CARPENTER, Maz. Cat. 259 (1856).

Fig. 211.

Neritina picta.

A very variable species found within the limits included in my work—at Mazatlan, as well as further south. The original description and figure are given above.

There is a *Neritina picta*, of Ferussac (Hist. fig. 4–7), found

fossil in France. Some of the references quoted above are referred to Ferussac's species by Grateloup (Soc. Lin. Bord. XI, 127). I have not the means of settling the synonymy.

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

Fig. 212.

Neritina showalteri.

Coosa River, ten miles above Fort William, Shelby County, Alabama: E. R. Showalter, M. D. My cabinet, and cabinets of Dr. Showalter and Dr. Lewis, and Academy of Natural Sciences. Diam. .22, length .18 inch.

The discovery of this shell by Dr. Showalter marks the first notice, I believe, of the genus *Neritina* being found in our waters. His very close observation and active investigations of the waters of central and northern Alabama have enabled him to lay the naturalists of this country under many obligations by new discoveries, and this is certainly one of much importance. We now see for the first time that this genus, which is common in Europe, Africa, Asia, South America, and the West Indies, also inhabits our southern rivers. I have great pleasure in naming the species after the discoverer. This species is not allied to any which has come under my notice. It is more rotund than usual, has a clear horn-colored epidermis, smooth and shining. The substance of the shell is so thin as to permit the column to be visible through it. The inner lip is broad and slightly notched where it is in contact to the body whirl. It is to be regretted that among the four specimens sent to me by Dr. Showalter neither had an operculum. The soft parts have not yet been observed. (*Lea.*)

Neritina showalteri, Lea, Pr. Acad. Nat. Sc. Phila. 1861, 55; Journal [n. s.], V, pt. 3, 267, pl. xxxv, f. 78, 78*a* (Mar. 1863); Obs. IX, 89.

I can add nothing to the knowledge of this species contained in Mr. Lea's description copied above. One of his figures is copied in my Fig. 212.

Neritella jayana, Recluz.—Shell rather small, transversely-ovate, thin, concentrically and delicately striated, yellowish under the epidermis, varied with delicate angularly-flexuosé, reticulated, small black lines and small white spots; behind generally of an uniform black; whirls three, almost conic above, and with a narrow canaliculated suture; spire inclined towards the side; labium compressed, white with black spots, edentulate and scarcely arched in the centre; labrum greenish-yellow. Height 4½, breadth 6, thickness 3 mill.

Fig. 213.

Neritina jayana.

North America?

We are indebted for this little species to Dr. Jay, of New York, in whose honor it is named. It cannot be confounded with the European species *N. fluviatilis*—of which it is the American analogue—not only on account of its constant coloration, but still more on account of its conical spire and canaliculated suture. (*Recluz.*)

Neritina jayana, Recluz, Journ. de Conch. I, 157, pl. vii, f. 13 (1850).

I am unable to add any information regarding this species or its habitat, further than what is contained in the above copy of the original description and figure.

Spurious Species of Neritella.

Neritina striata, Besleri, from New Orleans is quoted in the synonymy of *Neritina zebra*, Brug., of Cayenne, by Recluz, in Journ. de Conch. I, 152, and

Neritina zigzag, Sowerby, from Florida, as a synonym of *Neritina lineolata*, Lam., of Cayenne. I can find no description or further information regarding the former, or any authority for the habitat given of the latter.

Family HELICINIDÆ.

Lingual membrane long, narrow, with numerous longitudinal series of teeth, arranged 00, 5, 1, 5, 00; see description of *Helicina orbiculata*, on p. 108. Head proboscidiform; tentacles subulate, with the eyes at their outer bases. Foot elongated. Operculum non-spiral, annular, semi-oval or subtriangular, with concentric elements, thick and testaceous, or thin and horny. Shell with the aperture semilunar.

HELICINA, Lam.

Animal long, heliciform, tentacles slender, drooping, eyes at their external base; proboscis truncated. Operculum non-spiral, somewhat semioval, membranous or testaceous. Shell heliciform, turbinate, globose or depressed, base callous around the columella, which is somewhat flattened, and rather straight; aperture tri-

Fig. 214.

Head of *Helicina orbiculata.*

Fig. 215.

Operculum of *Helicina.*

angularly semioval, entire; peristome simple, straight or thickened, often widely expanded. No horny jaw. Lingual mem-

Fig. 216.

Lingual dentition of *Helicina orbiculata*.—[TROSCHEL.]

brane with teeth arranged 00, 5, 1, 5, 00. Centrals small, apex broad, reflected; first and second laterals broader, rounded at base, apex recurved, denticulated; third lateral suboval, apex recurved, denticulated; fourth lateral long, narrow, irregular shaped, apex recurved, denticulated; uncini long, narrow, apex recurved, denticulated.

SUBGENUS **OLIGYRA**, SAY.

Shell subglobose or conic; spire equalling or excelling the last whirl, whirls ecarinate; peristome expanded.

Helicina orbiculata. SAY.—Shell subglobose, acute at apex, solid, smooth, very delicately striated; color yellowish, brownish, or ash-colored, with a linear, pale zone at the periphery, which passes up the spire at the suture, and makes it white; there are also in many specimens numerous capillary zones, and some specimens are mottled with pale spots; whirls five, well rounded, suture well impressed; aperture rather large, semilunar; peristome white, moderately reflexed, and often greatly thickened and protruded by age; columella short, joining

Fig. 217.

Helicina orbiculata, enlarged.

the peritreme at nearly a right angle, and forming thereby a denticular protruberance; base delicately enamelled. Diameter 9, height 6 mill.

Helicina (*Olygyra*) *orbiculata*, Say, Journ. Phila. Ac. I, 283; Nich. Encycl. ed. 3; Am. Conch. 5, pl. xlvi, f. 1–3; ed. Binney, 36, pl. xlvi, f. 1–3; ed. Chenu, Bibl. Conch. III, 58, pl. xv, f. 2, 2 *a*, 2 *c*.—Gray, Zool. Journ. I, 70.—Binney, T. Moll. II, 352, pl. lxxiii, lxxiv, f. 3.—DeKay, N. Y. Moll. 82 (1843).—Chemnitz, ed. 2, 74 (1846), pl. x, f. 32, 33.—Pfeiffer, Mon. Pneum. Viv. I, 375; II, 199 (excl. *H. rubella*).—Gray & Pfeiffer, Brit. Mus. Phan. 272 (not of Sowerby).—W. G. Binney, T. M. IV, 193, pl. lxxv, f. 18–20.

Helicina tropica, Jan in Chemnitz, ed. 2, p. 37, pl. iv, f. 9, 10.—Pfeiffer, Mon. Pneum. Viv. I, 375; II, 199.—Gray & Pfeiffer, Brit. Mus. Phan. p. 271.—W. G. Binney, T. M. IV, 194.—Troschel, Gebiss d. Schn. p. 81, pl. v, f. 9.

Helicina ambeliana, Sowerby, Thes. Tab. 8, pl. i, f. 19 (1842), not Roissy.

Helicina castanea, Sowerby, *l. c.*, 13, pl. i, f. 31, 32.

Helicina vestita, Guilding in Sowb., *l. c.*, p. 14, pl. i, f. 42.

Helicina minuta? Sowerby, *l. c.*, f. 40, 41.

Texas to Georgia; Tennessee to Florida. Also in the post-pleiocene of the Mississippi Valley.

Animal (see Fig. 214): Head and tentacles black, the other parts of the body dark. Tentacles long and slender, tapering to a point. Eyes black and prominent. Motion gliding as in *Helix*. Operculum horny, turning back upon the columella as if upon a hinge.

This species seems to be distributed over a very wide extent of territory, and also to be subject to great variations in size and coloring. From specimens collected in company, within a very small area, individuals might be selected differing so widely from each other that no one would hesitate to regard them as very different species, unless their history were known.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8443	5	Texas.	G. Wurdemann.	.....
8444	1	.....	.....	.....
8445	3	St. Simon's Island, Ga.	Dr. J. Lewis.	.....
8539	3	.....	W. G. Binney.	Cabinet series.
8446	75	Texas.	Lieut. Couch.	(*H. tropica.*)
8447	22	Indianola, Tex.	.....	"
8448	44	Tamaulipas, Mex.	Lieut. Couch.	"
8449	2	"	"	"
8538	5	Texas.	W. G. Binney.	" Cab. set.
8809	300?	"	"	"
8962	..	Hot Spr., Ark.	Dr. B. Powell.	.....

Helicina hanleyana, Pfr.—Shell globose-conic, rather solid, marked with impressed concentric, rather spaced lines; scarcely transparent, shining, reddish horn-colored; spire shortly conic, obtuse; whirls five, scarcely convex, the last rounded, slightly descending before; aperture slightly oblique, sub-semicircular; columella very short, denticulated without, with a diffuse, light white callus; peristome white, scarcely expanded, thickened within, ending in a basal columellar denticle. Greater diam. $7\frac{1}{2}$, less $6\frac{1}{2}$, height $5\frac{2}{3}$ mill.

Fig. 218.

Helicina hanleyana.

Helicina hanleyana, Pfeiffer in Proc. Zool. Soc. 1848, 122; Mon. Pneum. Viv. I, 376.—Chemnitz, ed. 2, 45, pl. ix, f. 7, 8.—Gray and Pfeiffer, Brit. Mus. Phan. 302.—W. G. Binney, T. M. IV, 192, pl. lxxv, f. 14, 16.

Near New Orleans.

Helicina chrysocheila, Binney.—Shell broad conic, or pyramidal, thin, shining, pale yellow, with the surface finely shagreened with microscopic, punctured lines; spire elevated, whirls five, moderately convex, the last one somewhat flattened at base and indistinctly angular at the periphery; aperture large, very oblique, semi-oval, the diameters about equal; the peristome broadly everted, especially at its middle portion, narrow and simple at its columellar junction, of a golden-yellow color; parietal callus extended, of a deep orange color. Diameter 10, height 8 mill.

Fig. 219.

Helicina chrysocheila.

Helicina chrysocheila, Binney, Terr. Moll. II, 354, pl. lxxiv, f. 4.—W. G. Binney, Terr. Moll. IV, 192.—Pfeiffer, Mon. Pneum. II, 197 (not of Shuttleworth).

Texas and Tampico in Mexico.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8535	1	Texas.	G. Wurdemann.	Cabinet series.
8536	..	Tamaulipas, Mex.	Lieut. Couch.	"

Helicina subglobulosa, Poey.—Shell globose-conic, solid, lightly striate, rather shining, uniformly white, or marked with two red bands, one broad near the suture, other narrow, near the periphery; spire convex-conic, rather sharp; whirls six, the upper ones flattened, the penultimate

more convex, subtriangulate, the last subcarinate, rather convex below; columella short, arched, dilated, marked with a white line, and covered with a light callus; aperture rather oblique, irregularly semioval; peristome wide, angularly spreading, sub-excavated, narrowing at each extremity. Greater diam. 10, lesser 8½, height 7 mill. (*Pfeiffer.*)

Fig. 220.

Helicina subglobulosa.

Helicina subglobulosa, Poey, Mem. I, 115, 120, tab. xii, f. 17–21.—Pfeiffer, Malak. Blatt. 1854, 107; 1856, 146; Mon. Pneum. Viv. II, 209.—W. G. Binney, T. M. IV, 195, pl. lxxv, f. 17.

Fort Dallas and Key Biscayne, Florida. Also Cuba.

The specimens received may, perhaps, be referable to *Hel. subdepressa*, Poey.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
8540	1	Fort Dallas, Fla.	W. G. Binney.	Cabinet series.

Spurious Species of Helicina.

Helicina fastigiata and *plicata* of DeKay, N. Y. Moll. 82, are respectively *Helix fastigans* and *Helix hazardi.*

Fossil Species of Helicina.

Helicina occulta, Say.—Shell small, rather solid, low conical, acute at apex, cretaceous, obviously striated; spire of five nearly plane whirls, the last of which is angular at the periphery, and this angle continuing up the spire adjacent to the suture, makes it appear double; the aperture is small, semi-lunar; the peristome is scarcely reflexed, but is thickened internally; the columella is very short, and joins the peristome by a slightly waving curve, without forming an angle. Diameter 6, height 5 mill.

Fig. 221.

Helicina occulta.

Helicina occulta, Say, Transylv. Journ. of Med. IV, 528 (1831); Descr. of New Terr. and Fluv. Shells (from the Diss.), p. 15 (1840); Am. Conch. V, pl. xlvi, f. 4–6 (1832): ed. Binney, p. 37, pl. xlvi, f 1–3 —Binney, Terr. Moll. U. S. II, 356, pl. lxxiv, f. 1, 2.—DeKay, N. Y. Moll. 82 (1843).—Pfeiffer, Mon. Pneum. Viv. I. 347.—Chemnitz, ed. 2, 18 (1846), pl. iv, f. 11, 12 (1850).—Gray &

PFEIFFER, Brit. Mus. Phan. 250.—W. G. BINNEY, T. M. IV, 193.

Helicina rubella, GREEN, in Doughty Cat. II, 291 (1832).

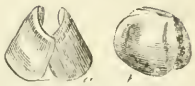
Very plenty in the postpleiocene beds of the West.

Cat. No.	No. of Sp.	Locality.	From whom rec'd.	Remarks.
8442	1	Sheboygan, Wis.	I. A. Lapham.	Fossil. Color remain-
8537	2	.....	W. G. Binney.	" Cab. ser. [ing.
8805	1	.....	W. Stimpson.	"

APPENDIX TO VIVIPARIDÆ, ETC.

Since the first portion of the preceding pages was printed the following additional species have been received:—

Fig. 222.



Jaws of *Pomus depressa*. *a*. Top view. *b*. Side view.

Pomus depressa. (Page 3.)

I am now able to give a figure of the jaws of this species.

Valvata pupoidea, GOULD. (Page 13.)

Fig. 223.

Valvata pupoidea.

A better view of this species than Fig. 19 is here given.

Page 14. The description of *Valvata humeralis* should have been accredited to Say.

Vivipara contectoides. (Page 23.)

Fig. 224.

Vivipara contectoides.

The figure of this species here given is to be substituted for that given on page 23, which incorrectly shows but three revolving bands. There are invariably four on all the specimens I have examined.

I neglected to state in the text that I did not adopt *linearis* as the specific name in this case, because it was probably a typographical error for *lineata* in Küster's monograph, and because it does not apply to the shell in question.

Vivipara inornata.—Shell minutely perforated, globose-conic, thin, smooth, polished, lines of growth extremely delicate on the body whirl, imperceptible above; color uniformly greenish or pale olive, unadorned with any revolving lines; the suture impressed, spire short, conical;

apex acute, distinct, not truncated; whirls regularly increasing, inflated, the last globose, equalling about two-thirds of the shell's length; aperture oblique, rounded, large; lip continuous in one plane; peristome thin, acute, continuous; columellar extremity appressed to the body whirl, almost entirely concealing a minute umbilicus; parietal wall of the aperture covered with a thin, shining, colorless callus. Length of axis 19 mill., breadth 17 mill.

Fig. 225.

Viviparа inornata.

Near Chopatilo, Mexico.

Vivipara inornata, W. G. Binney, Am. Journ. Conch. I, 49, 1865, pl. vii, f. 1.

It is after a very careful examination of the specimens brought from Chopatilo, that I have decided to propose for them a specific name. Having submitted them to several experienced Conchologists, I find my decision approved by them. It can be compared with no known American form.

The smooth, polished surface, unbroken by revolving lines, the pale olive color and acute apex, are the more prominent features of it.

About a dozen specimens were brought. On one is an obtuse, ill-defined carina on the middle of the body whirl.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9168	1	Near Chopatilo, Mex.	.....	Type.
9218	2	"	.....	.....

Fig. 226.

MELANTHO. (Page 35.)

Melantho, Bowditch.

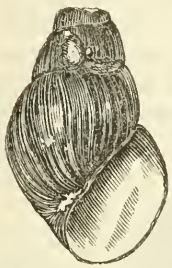
Bowditch thus describes and figures *Melantho* as a subgenus of *Melania* (Elem. Conch. 1822, p. 27, pl. iv, f. 15):—

Peristome incomplete, not effusive; very thick; white. Subglobular. Marine.

Melantho decampi, Currier.—Shell ovate, oblong, imperforate, rather thick, irregularly roughened by occasional coarse wrinkles of growth, decussated by delicate revolving and longitudinal striæ; greenish olive, with revolving dark broad lines when young, darker when old; suture impressed, spire elevated, but truncated; remaining whirls three, of which the two upper are flattened, the lower sub-convex, with a median obtuse

carina, reaching to, and modifying the peristome; aperture higher than broad, roundly lunate, produced below; bluish within: peristome simple, acute, sinuous, angular above at the termination of the carina. Greater diameter, including aperture, 22 mill., length 35 mill.; length of the aperture 20 mill., diameter 10 millimetres.

Fig. 227.



Melantho decampi.

Operculum horny, concentric.

Fig. 228.

Operculum of *Melantho decampi.*

Melantho decampi, W. G. Binney, Am. Journ. Conch. I, 49, 1865, pl. vii, f. 2, 3.

Huntsville or Stevenson, Alabama: Dr. W. H. DeCamp, 1st Michigan Vol. Engineers.

This species was given me by Mr. A. O. Currier, of Grand Rapids, Michigan, who suggested its bearing the name of its discoverer.

Fig. 229.

Melantho decampi.

About a dozen specimens were collected. All but the one drawn in Fig. 227 could not be distinguished from *Melania* without the presence of the opereulum, thus furnishing another example of the impossibility of ascertaining from the shell alone the generic position of some species. It is probable that other species of *Melantho* have been described as *Melaniæ*.

Fig. 227 was photographed from nature on wood. It represents the largest and oldest specimen. Fig. 229 is drawn from a younger individual.

Cat. No.	No. of Sp.	Locality.	From whom received.	Remarks.
9309	2	Huntsville or Steven-[son, Ala.	Currier.	Type. Fig. 227-9.

Gillia ——?

Fig. 230.

Gillia ——?

From Stephenson, Ala., and Powel's River, Tenn., has lately been received a new species of *Gillia*, here figured.

On page 63. *Paludina altilis* should have been referred to *Gillia.*

Paludina pallida, subglobosa, fontinalis, and *isogona* to *Somatogyrus isogonus.*

Paludina lustrica to *Pomatiopsis.*

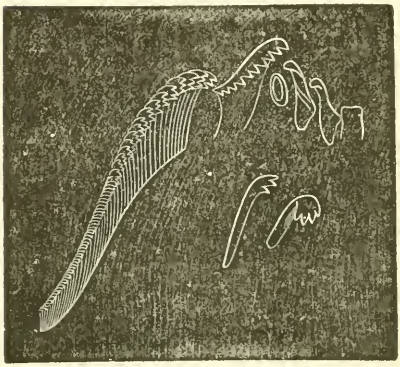
Fig. 231.

Helicina ——— ?

Helicina ——— ?

The Smithsonian Institution has just received from Mr. Xantus a specimen of *Helicina* from the Sierra Madre. I do not propose a name for it, as it may already have been described in Europe A figure is here given, almost twice the natural size, and a figure of the lingual dentition.

Fig. 232.



Lingual dentition of *Helicina* ——— ?

INDEX.

In the present index all synonyms and spurious species are in italics. Where several references are given for one name, the first relates generally to the page containing the full description.