STERKIANA

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CONTENTS

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ANNOUNCEMENT

STERKIANA is named after Dr. Victor Sterki (1846-1933) of New Philadelphia, Ohio, famed for his work on the Sphaeriidae, Pupillidae, and Valloniidae. It is fitting that this serial should bear his name both because of his association with the Midwest and his lifelong interest in non-marine Mollusca.

The purpose of STERKIANA is to serve malacologists and paleontologists interested in the living and fossil non-marine Mollusca of North and South America by disseminating information in that special field. Since its resources are modest, STERKIANA is not printed by conventional means. Costs are kept at a minimum by utilizing various talents and services available to the Editor. Subscription and reprint prices are based on cost of paper and mailing charges.

STERKIANA accepts articles dealing with non-marine Mollusca of the Americas in English, French, or Spanish, the three official languages of North America. Contributors are requested to avoid descriptions of new species or higher taxa in this serial as the limited distribution of STERKIANA would probably prevent recognition of such taxa as validly published. Papers on distribution, ecology, and revised checklists for particular areas or formations are especially welcome but those on any aspect of non-marine Mollusca will be considered.

STERKIANA will appear twice a year or oftener, as material is available. All correspondence should be addressed to the Editor.

SUBSCRIPTIONS: 50¢ per number; subscriptions may be entered for not more than 4 numbers in advance; please make checks and money orders payable to the Editor.

STERKIANA est une collection de travaux sur les Mollusques extra-marins des deux Amériques, distribuée par un groupe de malacologues du centre des Etats-Unis. STERKIANA publie des travaux en anglais, en français et en espagnol acceptés par le conseil de rédaction. Prière d'adresser toute correspondance au Rédacteur.

ABONNEMENT: 50¢ le numéro, par chèque ou mandat payable au Rédacteur.

STERKIANA es una coleccion de trabajos sobre los Moluscos extra-marinos viventes y fosiles de las dos Americas, editada por un grupo de malacólogos de los Estados Unidos centrales. Contenirá en el porvenir trabajos en inglés, francés, y español que serán acceptados por la mesa directiva. La correspondencia deberá ser dirigida al Editor.

PRECIO: 50¢ el número.

HAROLD HANNIBAL 1889-1965

Word was received in January at the California Academy of Sciences of the death of Harold Hannibal on December 17, 1965, after a prolonged illness. Conchologists will remember Mr. Hannibal for his work on fresh-water mollusks on the West Coast, especially for his chapter on them in the 1910 edition of Keep's 'West Coast Shells' and his 'Synopsis of the Recent and Tertiary Mollusca of the Californian Province' published in 1912 in the Proceedings of the Malacological Society of London. He was a graduate of Stanford University with a major in paleontology and was also the author of several important papers in this field.

Allyn G. Smith

NEW PUBLICATIONS

LOŽEK, Vojen (1964) Quartärmollusken der Tschechoslowakei. -- Prague, Rozpravy Ústředního ústavu geologického, Svazek 31, 373 p. 32 pls., 91 text figs. + maps and charts. 59 Kčs.

This magnificent quarto volume was prepared especially to coincide with the Seventh INQUA Congress, held in 1965 in the United States. It is the most thorough treatment of the Pleistocene Mollusca of one country to appear in recent years and it may well serve as a model for such monographs in future. The text is in German.

A. L.

WRIGHT, H.E. Jr. & FREY, David G. (1965) The Quaternary of the United States. A Review volume for the VII Congress of the International Association for Quaternary Research. -- Princeton University Press, Princeton, N.J., x - 922 p. illus. $25.00.

The work is divided into four parts, Geology, Biogeography, Archaeology, and Miscellaneous studies. The articles on Pleistocene Mollusca by D. W. Taylor (p. 597) and on Pleistocene nonmarine environments by Deevey (p. 643) are of special interest to readers of STERKIANA.

A. L.

REPRINTS OF RARE PAPERS ON MOLLUSCA: W.G. BINNEY, LAND AND FRESHWATER SHELLS OF NORTH AMERICA, PART II. PULMONATA LIMNOPHILA AND THALASSOPHILA. (CONCLUSION)

With this instalment of Binney's Manual, we complete the reprinting of the text of this important reference work. The figures, which have been referred to by inserts in their place in the text, will be gathered into plates and printed in a future number of STERKIANA.

Binney, p. 96

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 rhombidea, Meek & Hayden, Pr. Phil. Ac. 1856, 119.

(PAGE 97)

BULINUS, Adanson.

Tentacles filiform, setaceous. Mantle simple-edged, and not reflexed over the shell. Foot long, acuminate behind.

Binney, p. 97

Shell siniatrorsal, elongated, polished, thin; spire acuminated; aperture narrow, produced anteriorly; inner lip simple; outer lip acute.

Fig. 165.

Jaw (of *B. hypnorum*) strongly arched, narrow, cartilaginous, brown.

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 *Nasta*, Leach, and is accompanied by a careful description and excellent figure.

Bulinus aurantius, Carpenter.--Shell thin, ovate, smooth or marked with very delicate incremental striae, 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.

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 maugerae*, which is believed to be a Caribbean 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.

(PAGE 98)

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 long. 1.25, long. spir. .24, lat. .7. The largest specimen must have measured 1.43; mean diverg. 60°.

Mazatlan; not common *(Carpenter.)*

Aplexa aurantia, Carpenter, Brit.
Fig. 167. 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 maugerae* 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.
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. 11¾''; diam. 6¾''; ap. 8¾''' long, 3½'' 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.

(PAGE 99)

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 symmetri-
Fig. 169. cal 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.

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, Linnaeus.--Shell heterostrophe, pale yellowish, very fragile, diaphanous, oblong, whirls six or seven; spire tapering, acute at the tip; suture slightly im-
Fig. 170. pressed; 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.

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 *Limnaea 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 of the anterior side. Its proportions are somewhat similar to those of *P. hypnorum*. *(P. elongata*, Say.)

(PAGE 100)

Binney, p. 100

Physa hypnorum, Linnaeus, &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,* De Kay. 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.

Fig. 171.

Length 0.4, of aperture 0.2.

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).*

(PAGE 101)

Binney, p. 101

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. A. C. Currier. .....
9280 500 Yukron, m. of Porcupine. 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.

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 (Isidora) integra, Chenu, Man. de Conch. II, 481, f. 3556.

My figure is a fac-silile of one of Haldeman's, whose description also is given above.

(PAGE 102)

Cat. No.; No. of Sp.; Locality.; From whom received. Remarks.

8110 56 Nolachucky R., Tenn. ....
8111 6 ..... Dr. J. Lewis. .....

Binney, p. 102

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.

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 gyrinastro, sp?*

Bulinus maugerae. 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).

Binney, p. 102

Aplexa subelongata, Meek & Hayden, MSS. (*Physa subelongata,* Pr. Phila. Acad. 1856 120.)

(PAGE 103)

PLANORBIS, GUETTARD.

Fig. 174. 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.

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 fac-similes of his figures in a different position from those of other authors.

Fig 176.

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.

Binney, p. 104

(PAGE 104)

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 Wwshoe *(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, sub-
Fig. 177. equidistant 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.

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.

Binney, p. 104

Gould's description and figure of *Pl. lentus* is referred by Haldeman to *Pl. fallax.*

(PAGE 105)

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, somewhatkidney-shaped. Fig. 178.

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 caribaeus, 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.

Binney, p. 105

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. Berlandiére.
8177	29	"	Lt. Couch.	
8502	..	"	"	Cabinet series.

(PAGE 106)

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.

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, 180 (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. Lewis.	
8500	5	"	"	Cabinet series.

Binney, p. 106

Planorbis tumens, Carpenter.---Shell rapidly swelling, small, horn or reddish smoke-colored; whirls four or five, with light waving striae; 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.

Fig. 180.

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

(PAGE 107)

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 tenagophilus, 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.

Plwnorbis 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.

Shell discoid, thin, fragile pale horn or yellowish in color, with very delicate and numerous striae; both above and below flattened and umbilicate in the centre, but some-

Binney, p. 107

what 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 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.L*

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. 1½'''. (Pfeiffer).

(PAGE 108)

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.

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.)*

Binney, p. 108

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 1/8, diam. ½ inch.

Fig. 183.

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.)*

(PAGE 109)

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.	

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.

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).--DeKay, 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.

(PAGE 110)

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 striae, 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	Quasquitan, 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.

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.)*

(PAGE 111)

Binney, p. 111

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.

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.

(PAGE 112)

Binney, p. 112

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 5/8 to 1, diam ¼ to ½ inch. Fig. 187.

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 striae 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.

(PAGE 113)

Planorbis traskii, Lea.--Shell large, horn-colored, subcylindraceous, minutely, regularly and closely striated, deeply and broadly umbilicated above; more excavated below; whirls obtusely carinated below; aperture ear-shaped. Fig. 188.

Binney, p. 113

Kern Lake, Tulan Co., California: Dr. Trask. *(Lea.)*

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.

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 2/3 - 5 lines.

Common among graves near Mexico, with *Limnaeus 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.

(PAGE 114)

The above description and figure are copied from Chemnitz, ed. 2.

Binney, p. 114

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.

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 carinae 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.

Binney, p. 114

I am inclined to believe that Say had before him a form of *Plan. trivolvis* when he drew his description of *Plan. corpu-*

(PAGE 115)

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.

Fig. 192.

The shell 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.

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	"	Com. Wilkes.	.....
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?	Cabinet ser. W.C.
9119	1	Washington Territory		

Planorbis trivolvis, Say.—Shell sinistral, pale yellow, brownish or chestnut color, sub-

Binney, p. 115

carinate above and beneath, particularly in the young shell; whirls three or four, striate across with fine, raised, equidistant, acute

(PAGE 116)

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.

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).

Binney, p. 116

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).

Planorbis corpulentus, DeKay, N.Y. Moll. 64, pl. xiii, f. 185 (1843).—Whittemore, Am. Journ. Sc. [I], 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).

(PAGE 117)

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. Poey catalogues it among the Cuban shells.

Fig. 195.

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.

Hab. United States. My cabinet, and cabinet of P. H. Nicklin. Diam. .30, length .20 of an inch.

Fig. 196.

Binney, p. 117

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 striae 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.)*

(PAGE 118)

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 whorl 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.

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 in-

termediate 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.

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.)*

(PAGE 119)

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 costae; 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.

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 striae; 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 sub-trigonal and irregular, which is caused by a depression below.
Diam. 20 mill., height 10 mill. Fig. 200.

North America in Ohio. *(Potiez & Michaud.)*

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

(PAGE 120)

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.

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

Binney, p. 120

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 cannot enjoy. *(Haldeman.)*

(PAGE 121)

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	13	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. R. Kennicott. .....
8149	3	Little R., near Shawneetown. .....
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. ....
8156	5	Lake Como, St. Pauls, Min. S.B. ....
8157	4	Prairie Lakes, n. Red R. R. Kennicott. .....

Binney, p. 121

8158	16	Southern Illinois. R. Kennicott. .....
8159	5	Grindstone Creek. ....
8160	12	Ruby Valley? Cap. J. H. Simpson. ...
8161	2	Delaware River. W.G. Binney. Labelled by Dr. R. E. Griffith.
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. Young.
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. ..... Cabinet series.
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 umbilicated, the concavity bordered by an obtuse carina; the volutions seen from this side are scarcely more than

(PAGE 122)

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

Fig. 202.

Binney, p. 122

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 bluish white callus, bordered on the inner edge by a purplish band; the longitudinal lines, as well as the transverse lines of growth, are distinctly seen within the aperture. Measurements, 6-35.

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 Winchell'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 a-
Fig. 203. bove, below rather concave; whirls four, involute, on each side rounded, rapidly increasing; the upper ones spirally striated and decussated, conspicuous below; aperture large, spreading, oblique, kidney-shaped; lip very acute, with a very delicate, white callus on the parietal wall.

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 striae; 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 3½ lines.

(PAGE 123)

Hab. Near Mexico, with *P. tenuis,* which is, however, a rarer species: David & Herr Geb. M. R. Dr. N. Meyer. *(Küster.)*

Binney, p. 123

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 striae; 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 retusumbilicate, forming a cavity as deep as that of the base. Aperture large, embracing a considerable portion of
Fig. 204. the body whirl, and Fig. 205. 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.

Inhabitant aquatic, ferruginous, with numerous yellowish dots; tentaculà 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 striae, 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, pp. 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).

Binney, p. 124

(PAGE 124)

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.

Helix angulata, Rackett *(l.c.)*.--
Fig. 206 Shell imperforate, concave on both sides; first whirl angulated on both sides.

Hab. Near Lake Huron. Diam. ½ inch.

Transversely striate, pale yellow; three to four contiguous whirls; aperture large, rimmed. *(Rackett.)*

Planorbis engonatus, Conrad.--Shell yellowish, triangulated above, spire not profoundly impressed, side of the body whirl
Fig. 207 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.	.....

Binney, p. 124

(PAGE 125)

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. [I], XXV, No 2, p. 343 (1834).--DeKay, N. Y. Moll. 66 (1843).--Muller, 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

Sacramento River, California.

Binney, p. 125

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. 88, 212 (1847); U.S. Ex. Ex. Moll. 113, f. 132. 132 *a*, 132 *b* (1852); Otia, 42.

(PAGE 126)

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, 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.	
9118	3	Whidby's Island.	Judge Cooper.	Type. Fig. 209 *(planulatus)*.

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 subtriangular; 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 ¼ of an inch.

Fig. 210.

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

Binney, p. 126

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. iv, f. 62, *a*, *b* (1843).--Anon. Ca n. Nat. II, 207, fig. (1857).

Planorbis lens, Lea, Tr. Am. Phil. Soc. VI, 68, pl. xxiii, f. 83; Obs. II, 68 (1839).

(PAGE 127)

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. Fig. 211.

Near Poland, Ohio: Dr. Kirtland. Cabinet of Mr. Hyde.

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.)*

Binney, p. 127

Planorbis buchanensis, Lea, is evidently synonymous with *P. exacutus*. The original description and figures from Mr. Lea's type now follows:—

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.

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.)*

(PAGE 128)

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 preoccupied 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.

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. .....

Binney, p. 128

8211 10 Ann Arbor, Mich. W.G. Binney. .....
8494 2 ..... "
Cabinet series.
8508 3 Yellowstone River. Dr. F. V. Hayden. Marked *Pl. lens* by I. Lea.
9252 1 ..... *(lens*, teste Lea.)

SUBGENUS GYRAULUS, AGASSIZ.

Shell orbicular above, flat beneath; whirls few, rapidly increasing.

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. Fig. 214.

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

(PAGE 129)

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, sub-oval, Fig. 215.

Binney, p. 129

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.

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).--De Kay, 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).

(PAGE 130)

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 striae of growth, and very slightly 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.

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.

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

(PAGE 131)

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. .....
8192 1 Lake of the Woods. R. Kennicott.
8191 14 Loup Fork. ....
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.

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.)*

(PAGE 132)

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. Fig. 220.

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;

Binney, p. 132

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-*

(PAGE 133)

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,

Fig. 222. body generally subcarinate on the margin; lip

Fig. 223.

rounded, and not vaulted above nor thickened; mouth within bluish-white. Breadth one-fifth of an inch.

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

Binney, p. 133

with the two preceding shells. Fig. 224. *(Say.)*

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).--De Kay, 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.

(PAGE 134)

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.

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.

Binney, p. 134

This species much resembles *P. parvus*, 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* by Anthony.
9295	1	Otter Tail Creek, Min. Kennicott.

(PAGE 135)

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.

Binney, p. 135

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 the 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.

(PAGE 136)

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.

Binney, p. 136

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 striae 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 plicae, not forming open partitions.

Segmentina wheatleyi, Lea.—Shell small, dark horn-colored, flat, obsoletely striated, bicarinate, depressed above, broadly and deeply

(PAGE 137)

umbilicated below; whirls five, obtusely carinated above, below acutely so; aperture white, thick, strongly constricted; within are six teeth. Fig. 227. Cotoma Creek, Montgomery Co., Ala. *(Lea.)*

Fig. 226.

Planorbis wheatleyi, Lea, Pr. Phila. Acad. 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

Binney, p. 137

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 tooth near the base, and two slightly elevated, oblique, lamelliform ones above. Length ¼ of an inch nearly.

Fig. 228. Fig. 229.

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.

(PAGE 138)

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

Binney, p. 138

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 Lwke.	"	.....

SUBFAMILY ANCYLINAE.

Shell non-spiral, conical, limpet-like.

All the known genera of *Ancylinae* are represented in North America except *Latia*, which has a spiral shell and a transverse septum in the aperture.

ANCYLUS, Geoffroy.

Fig. 230 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 papillae, one superior, small, transversely oblong, two lateral, long, very slightly arcuate, contiguous to the superior.

(PAGE 139)

Lingual membrane broad; teeth crowded, numerous; central

Fig. 231.

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

Binney, p. 139

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 poste- Fig. 232. rior; 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.)*

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.

(PAGE 140)

worth (in Berne Mittheil., 1854, p. 98) 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 Fig. 233. middle, inclining to the right so as to have only two-fifths of the width

Binney, p. 140

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.

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. [I], 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.

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*,

(PAGE 141)

Binney, p. 142

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, 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.)*

Binney, p. 141

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.

(PAGE 142)

Ancylus sallei, Bourguignat.--Shell convex anteriorly, posteriorly rectilinear or slightly convex; left side convex, right side rectilinear; posterior apex declinimg 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: Fig. 237. Long. 0.25, lat. 0.15, elev. 0.08 inch *(Adams).*

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).

Binney p. 142

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 Fig. 238. one end; aperture oval, rather narrower at one end, entire; within milk-white. Length one-fourth of an inch. Cabinet of the Academy.

Common; adhering to stones in rivulets; the animal resembles the inhabitant of shells of the genus *Limnaea,* the tail is very obtuse, rounded. *(Say.)*

(PAGE 143)

Ancylus rivularis, Say (Oct. 1819), J. A. N. 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.

Ancylus tardus, Say.--Shell conic depressed; apex behind the middle obtuse, rounded, inclining backward but not laterally; line from the apex to the anterior tip arcuated; aperture oval, not distinctly narrowed at one end. Length a little over Fig. 239. three-twentieths (4.25), breadth one-tenth of an inch.

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.

The specimen which furnished the above description was one of the largest which I hove seen. They are more commonly of the

(PAGE 144)

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 patelloides, Lea.--Shell large, thick, elliptical, spotted, obliquely conical; striae minute, crowded; apex submedial.

Fig. 241.

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

Ancylus patelloides, 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 ¼, breadth ¼ inch.

Hab. Rivers Kootanie and Spokane, British Columbia. Brit. Mus.

The shell is of an ovate form, and is concentrically striated, though the striae 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.)*

Fig. 242.

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, Cooper.

Ancylus caurinus, Cooper, in Reports on Nat. Hist., &c., of Minnesota, Nebraska, Washington, &c., p. 378 (1859); P. R. R. XII, 378.

(PAGE 145)

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.

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

Binney, p. 145

Ancylus newberryi, Lea, Proc. Acad. Nat. Sc. Phila. 1858, 166. Fig. 244.

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.

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.

(PAGE 146)

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.

Laguna Honha, California: Rev. J. Rowell. My cabinet, and cabinet of Mr. Rowell.

Binney, p. 146

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.)*

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.

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*.

(PAGE 147)

Binney, p. 147

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 papillae; 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 *Velletia* is sometimes used for this genus, because Beck 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 13/40, breadth ¼, height 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.

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).

Binney, p. 148

(PAGE 148)

--DeKay, N. Y. Moll. 13 (1843).--Miller, 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.

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.

(PAGE 149)

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 obli- Fig. 250.

Binney, p. 149

quely 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 striae. 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.

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.

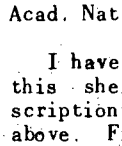

Fig. 251.

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.

(PAGE 150)

From one of the same lot the lingual membrane figured on page 148 was drawn.

Binney, p. 150

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, 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.

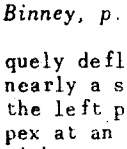

Fig. 252.

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 striae 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

Binney, p. 150

succeeded in finding any differences of importance. I add here a figure of its lingual

(PAGE 151)

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.

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

Binney, p. 151

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.

(PAGE 152)

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, *Amphibolidae,* 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 *Siphonariidae.* Still, they have the lingual dentition of Pulmonata, the mantle margin nearly closed, and but rudiments of gills.

FAMILY SIPHONARIIDAE.

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 *Siphonariidae* are marine in their habits, living near the sea, on rocks between tide marks, or higher above the wwter 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 sub-central, oblique, recurved posteriorly; aperture wide, margin irregular,

Binney, p. 152

crenulated; muscular impression crescentic; a syphonal groove on the right side, which is extended in a projection beyond the margin.

(PAGE 153)

Hermannsen uses the name *Siphonaria* in preference to *Liria*, Gray.

The *Siphonariae* 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.

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 aequilirata, Carpenter.--Shell sub-conic, oval, regular, radiately ornamented with numerous subrugose, 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.

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.

Binney, p. 153

Cuming; but as the riblets are bifurcating, it is probably not fully grown. There is no trace of striulae. 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 aequilirata, Carpenter, Maz. Cat. 184.--Reeve, Con. Icon. 15.

Gulf of California. Mazatlan. Fig. 255 is copied from Reeve.

(PAGE 154)

Siphonaria amara, Reeve.--Shell ovate, depressly conoid, apex anteriorly uncinate, radiately closely ribbed and ridged; black, rayed with white bands. Fig. 256.

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 with radiating subrugose striae; ribs and internal margin sometimes white; apex subcentral, 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 subconical specimen, .76, alt. .24 inch. Fig. 257.

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*.

Binney, p. 155

(PAGE 155)

ADDENDA

Limnaea stagnalis. (See p. 28).

Fig. 257 represents the lingual dentition of a specimen lately

(Fig. 257.)

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, 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.

This species resembles *Bulinus elatus,* 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.

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.*

Binney, p. 156

(PAGE 156)

Ancylus borewlis, 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.

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.

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 sccretion 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 PLANORBINAE.

Shell spiral, discoidal or depressed, many whirled; aperture crescentic.

Binney, p. 157

(PAGE 157)

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.

(PAGE 158)

Binney, p. 158

Binney, p. 158

(PAGE 159)

Binney, p. 159

Binney, p. 159

(PAGE 160)

Binney, p. 160

Binney, p. 160

(PAGE 161)

Binney, p. 161

A COLONY OF THE INTRODUCED EUROPEAN SNAIL, *CEPAEA NEMORALIS*, AT LYNN, MASSACHUSETTS

RALPH W. DEXTER

DEPARTMENT OF BIOLOGICAL SCIENCES
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W. G. Binney introduced the European land snail *Cepaea nemoralis* (L.) (formerly placed in genera *Tachea* and *Helix*) into North America in 1857. He planted a colony at his home in Burlington, New Jersey, with specimens obtained from Sheffield, England. From his yard this snail spread throughout the town by 1869 (Gould and Binney, 1870). The species was first found in Massachusetts in the town of Marion in Plymouth County.

Dorothy E. Snyder, Curator of Natural History at the Peabody Museum, Salem, Massachusetts, kindly sent me the following quotation from the 1926 unpublished report of one of her predecessors, A.P. Morse: 'In the fall of 1926 a teacher at Wellesley brought from Marion, Mass., a living land snail to show her class. On seeing it I suspected something of unusual interest, begged it from her, and was enabled to give to her the credit for discovering the first known colony of the European *Helix nemoralis* in New England.' Johnson (1927a, 1927b) published the first record of this colony based on specimens collected 10 October 1926. He was of the opinion that this colony might have been introduced with rose bushes imported from Ireland. Clench (1930) gave additional notes on the Marion colony. From this colony another one was transplanted at Norwell, also in Plymouth County, Massachusetts (Pilsbry, 1939). Rehder (1947) reported on a colony discovered in Jamaica Plain near Boston, Massachusetts, and gave an analysis of the color patterns.

There are several older but indefinite records for Massachusetts. Reeve (1863) stated that, 'Helix nemoralis---has been transported to the U.S. and keeps to the eastern parts near the sea, especially the lower extremity of Cape Cod and Cape Ann.' No precise data are given, however. Also, in the Mollusk Department at the Museum of Comparative Zoology there are two specimens of *C. nemoralis* (No. 125863) which were collected at Cape Ann, Massachusetts. These were received in August of 1940 from the Grand Rapids Public Museum in Michigan. They have the banding formulae 1-2-3-4-5 and 0-0-3-0-0. Information supplied by Dr. William J. Clench, Curator of Mollusks, M.C.Z.) Possibly these are the ones referred to by Taylor (1914) who wrote that the species was 'reported from Cape Ann, Mass., by Mr. Bryant Walker.' Nothing else is known about them, but should this prove to be the case, this record would be the first specimen record for Massachusetts. The writer has never found this species on Cape Ann, although he has collected *C. hortensis* around the periphery of that promontory since 1951. A preliminary report on these colonies at Cape Ann has already been given (Dexter, 1959).

An unpublished record of *C. nemoralis* from Massachusetts has been sent to the writer by Dr. Henry van der Schalie, Curator of Mollusks, Museum of Zoology at the University of Michigan, who has kindly given permission to report it here. Six specimens (No. 153365) were collected on Martha's Vineyard, an island off Cape Cod, by J.H. Thompson. No date was recorded.

On 6 August 1959, and on 19 July 1960, a collection of *C. nemoralis* was made for the writer by Clifford and James Snow and their father James Snow, Sr. at Roanoak Hill in Lynn, Massachusetts. Table I gives an analysis and comparison of these two collections. With reference to the background color, two varieties were recognized--yellowish and pinkish. These have been designated by some writers as var. *libellula* and var. *rubella*. Proportion of the two was not the same each year, but the samples were not large and were far from being equal. In the combined samples the pinkish shells were 3.7 times as common as the yellowish ones. Twelve combinations of banding were found altogether, all but one, (1-2-3-4-5), being represented in 1959. Only seven patterns were

collected in the smaller sample of 1960. In both samples, however, as well as in the combination of the two, the following banding patterns were most frequent with a single minor exception. These are indicated on the table as: (1) 0-0-3-4-5 on a pink background; (2) 0-0-0-0-0 on a pink background; (3) 0-0-3-(4-5) on a pink background; (4) 0-0-3-4-5 on a yellow background; and (5) 0-0-0-0-0 on a yellow background. Banding patterns 0-0-3-4-5 and 0-0-0-0-0 made up 73 percent of the total collection.

In 1959, a selection of 11 snails was given to Mrs. Otis Dana of Rockport, Mass. Two of these escaped into her yard. The following year another live set was given to her in an attempt to establish a colony. Mrs. Dana released several snails in her yard at Rockport, at Loblolly Cove, and at Eastern Point on Cape Ann. At least five adults survived in her yard by midsummer of 1961, and several immature individuals were located. However, Bluejays devoured some of these. In 1962 only one snail was observed and none found since then. It is believed that Bluejays, which persistently sought them, eliminated this species before it could become established at that location. In 1962 a single specimen was found at Loblolly Cove on a bloom of elderberry. Whether the species will become established there or at Eastern Point remains to be seen.

Soon after samples were collected at Roanoak Hill, a housing development greatly changed the natural environment in which the snails were living. Nevertheless, many survived and have been found in the gardens and lawns of the neighborhood (communication of Clifford Snow, 1966). Presumably new colonies may be established by birds carrying snails to new localities and by transplanting, through human agencies, soil containing eggs.

It is noteworthy that the Lynn colony sample contained only 13 with five bands. Pilsbry (1928) reported that in a collection made from a colony in Ontario, Canada, known to exist for at least 38 years, all shells were five-banded except one. On the other hand, McConnell (1935), repeating the study of Howe (1898) showed that in a colony at Lexington, Virginia, the bandless pattern 0-0-0-0-0 increased five fold over a period of 32 years, and the five-banded forms were only two-thirds as numerous, and were less than one-half as frequent in 1930 as in 1898. However, Howe (1898) reported that following the introduction of some bandless snails at Blairstown, Pa., the colony had a preponderance of banded varieties some years later. Jacobson and Smith (1946) found the bandless form to predominate in a colony they studied in New York, but the five-banded form was second most numerous and was 36 percent as common as the bandless form. Judd (1953) reported on a colony from Ontario in which five-banded forms (with partial fusion of 4-5 in many cases) predominated, while Landman (1956) found in a colony at Queens, New York City, that the bandless type predominated. Apparently differences in proportion of banding pattern are to be expected. According to Schilder (1949) there are theoretically 89 possible combinations of banding patterns, all of which have been found in Europe, but some have never been reported from North America. A recent study on some polymorphic land snails in Africa (Owen, 1965) disclosed that variation of shell color and pattern was greater when the snails are found in high population densities. The author suggested that *Cepaea* variations may show a similar correlation.

Flipse (1943) published the first record of a mixed colony of *C. nemoralis* and *C. hortensis* for North America. It was found on Long Island, N.Y., in 1945. While *C. nemoralis* is abundant at Lynn, Mass., and the writer has collected abundant specimens of *C. hortensis* in 13 localities at Cape Ann, some 23 miles away, the two have never been found living together in those areas.

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TABLE I. Analysis of color patterns of *Cepaea nemoralis* from Roanoak Hill, Lynn, Mass., 1959-60.

	1959		1960		Total for	Total for
	Yellow Background	Pink Background	Yellow Background	Pink Background	Yellow Background	Pink Background
1-2-3-4-5	6	6		1	6	7
(1-2)-3-4-5		1				1
1-2-3-(4-5)	7	5			7	5
(1-2)-3-(4-5)	1	2		3	1	5
(1-2-3)-(4-5)	2	2			2	2
(1-2-3-4-5)				2		2
0-2-3-(4-5)		1				1
0-0-3-4-5	33	95	4	19	37 (4)	114 (1)
0-0-3-(4-5)	3	46		11	3	57 (3)
0-0-0-(4-5)		1	1		1	1
0-0-3-0-0	2	1			2	1
0-0-0-0-0	21	94	2	13	23 (5)	107 (2)
Totals	75	254	7	49	82	303
	329		56		385	

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