

## REPRINTS OF RARE PAPERS ON MOLLUSCA

---

SMITHSONIAN MISCELLANEOUS COLLECTIONS  
143

## LAND AND FRESH WATER SHELLS

O F

## NORTH AMERICA

PART II.

PULMONATA LIMNOPHILA AND THALASSOPHILA.

BY

W. G. BINNEY

---

REPRINTED WITH THE  
PERMISSION OF THE  
SMITHSONIAN INSTITUTION

FIRST PRINTED  
SEPTEMBER, 1865

---

PREFATORY NOTE

Almost a hundred years ago, the Smithsonian Institution issued Binney's Pulmonata Limnophila and Thalassophila. Although the original edition was ample and most libraries have a copy, yet the individual malacologist often wishes to have a copy of his own. To fulfill this wish STERKIANA will reprint this work in several instalments, identified as to original pagination, and indicating the position

of each figure in the text. The figures will be gathered into plates because of the higher cost of reproduction. The Editorial Board of STERKIANA and the Editor take this opportunity of thanking the officials of the Smithsonian Institution for permission to reprint this important work.

A. L.

(PAGE iii)

## PREFACE

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

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

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

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

(PAGE iv)

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

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

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

W. G. BINNEY.

Burlington, N.J., August, 1865.

(PAGE v)

## CONTENTS.

Preface . . . . .	iii	Physella . . . . .	73
Systematic index . . . . .	vii	Pompholyx . . . . .	73
Suborder Limnophila . . . . .	1	Carinifex . . . . .	74
Auriculidae . . . . .	1	Physa . . . . .	75
Auriculinae . . . . .	3	Bulinus . . . . .	97
Auricula . . . . .	3	Planorbinae . . . . .	103
Alexia . . . . .	4	Planorbis . . . . .	103
Carychium . . . . .	6	Segmentina . . . . .	136
Melampinae . . . . .	9	Ancylinae . . . . .	138
Melampus . . . . .	9	Ancyclus . . . . .	138
Tralia . . . . .	16	Acroloxus . . . . .	147
Leuconia . . . . .	18	Gundlachia . . . . .	148
Pedipes . . . . .	19	Suborder Thalassophila . . . . .	152
Blauneria . . . . .	20	Siphonariidae . . . . .	152
Otinidae . . . . .	21	Siphonaria . . . . .	152
Limnaeidae . . . . .	22	Addenda . . . . .	155
Limnaeinae . . . . .	24	Index . . . . .	157
Limnaea . . . . .	24		( v )

(PAGE vii)

## LAND AND FRESH WATER SHELLS OF NORTH AMERICA

## II.

## SYSTEMATIC INDEX.

	PAGE		PAGE
PULMONATA.*	1	MELAMPINAE	9
SUBORDER LIMNOPHILA.	1	Melampus, Montf.	9
AURICULIDAE.	1	3. Melampus olivaceus, Cpr.	9
AURICULINAE	3	4. Melampus bidentatus, Say.	10
Alexia, Gray.	4	5. Melampus flavus, Gmel.	12
1. Alexia myosotis Drap.	4	6. Melampus coffea, L.	13
Carychium, Mull.	6	Tralia Gray.	16
2. Carychium exiguum, Say.	6	7. Tralia floridana Shutt.	16
		8. Tralia pusilla, Gmel.	17
		9. Tralia cingulata, Pfr.	18
		Leuconia, Gray.	18
		10. Leuconia sayii, Küst.	18

\* It has been impossible to follow here the elaborate type-setting scheme of the original.

Pedipes, Adans.	19	Carinifex W.G. Binney.	74
11. Pedipes lirata, W.G.B.	20	46. Carinifex newberryi, Lea.	74
Blauneria, Shutt.	20	Physa, Drap.	75
12. Blauneria pellucida, Pfr.	21	Physa.	
LIMNAEIDAE.	22	47. Physa lordi, Baird.	77
LIMNAEINAE.	24	48. Physa gabbi, Tryon.	77
Limnaea Lam.	24	49. Physa gyrina, Swy.	77
13. Limnaea stagnalis, L.	25	50. Physa ampullacea, Gld.	79
14. Limnaea lepida, Gld.	29	51. Physa sayii, Tappan.	80
Radix, Montf.	30	52. Physa vinosa, Gld.	80
15. Limnaea ampla, Migh.	30	53. Physa ancillaria, Say.	81
16. Limnaea decollata, Migh.	31	54. Physa osculans, Hald.	82
17. Limnaea columella, Say.	32	55. Physa mexicana, Phil.	83
Bulinna, Hald.	37	56. Physa heterostropha, Say.	84
18. Limnaea megasoma, Say.	37	57. Physa fragilis, Migh.	89
Limnophysa, Fitz.	38	58. Physa semiplicata, Küst.	90
19. Limnaea reflexa, Say.	38	59. Physa costata, Newc.	91
20. Limnaea attenuata, Say.	42	60. Physa solida, Phil.	91
21. Limnaea sumassi, Baird.	43	61. Physa virginea, Gld.	91
22. Limnaea haydeni, Lea	44	62. Physa humerosa, Gld.	92
23. Limnaea palustris, Müll.	44	63. Physa pomilia, Conr.	93
24. Limnaea proxima, Lea.	48	64. Physa virgata, Gld.	93
25. Limnaea desidiosa, Say.	48	65. Physa troostiana, Lea.	93
26. Limnaea emarginata, Say.	51	66. Physa triticea, Lea.	94
27. Limnaea catascopium, Say.	53	67. Physa concolor, Hald.	94
		Physella, Hald.	94
(Page viii)		68. Physa globosa, Hald.	94
		Physodon, Hald.	95
		69. Physa microstoma, Hald.	95
28. Limnaea caperata, Say.	56	Bulinus, Adanson.	97
29. Limnaea vahliae, Bk. & Müll.	57	Bulinus.	
30. Limnaea pingelii, Beck.	58	70. Bulinus aurantius, Cpr.	97
31. Limnaea wormskioldii Mörch.	58	71. Bulinus nitens, Phil.	98
32. Limnaea holböllii Beck & Müll.	59	72. Bulinus elatus, Gld.	99
33. Limnaea adelinae, Tryon.	59	73. Bulinus hypnorum, L.	99
34. Limnaea vitrea, Hald.	60	74. Bulinus berlandierianus, W.G.B.	101
35. Limnaea traskii, Tryon.	60	and 155	
36. Limnaea pallida, Ad.	60	Isidora, Ehr.	101
37. Limnaea bulimoides Lea.	61	75. Bulinus integer, Hald.	101
38. Limnaea solida, Lea.	62	76. Bulinus distortus, Hald.	102
39. Limnaea humilis Say.	63		
40. Limnaea ferruginea, Hald.	67	PLANORBINAE.	
Leptolimnaea, Swains.	67	Planorbis, Guettard.	103
41. Limnaea kirtlandiana, Lea.	67	Planorbis.	
42. Limnaea lanceata, Gld.	68	77. Planorbis subcrenatus, Cpr.	103
Acella, Hald.	69	78. Planorbis lentus, Say.	104
43. Limnaea gracilis, Jay.	69	79. Planorbis tumidus Pfr.	105
-----?	73	80. Planorbis glabratus, Say.	106
44. -----? berendti, Pfr.	73	81. Planorbis tumens Cpr.	106
		82. Planorbis havanensis, Pfr.	107
Pompholyx, Lea.	73	83. Planorbis liebmanni, Dkr.	108
45. Pompholyx effusa, Lea.	74	Planorbella, Hald.	109
		84. Planorbis campanulatus, Say	109

(PAGE ix)

85. <i>Planorbis haldemani</i> Dkr.	110	107. <i>Ancylus fuscus</i> , Ad.	140
<i>Adula</i> , H. Adams.	111	108. <i>Ancylus elatior</i> , Anth.	140
86. <i>Planorbis multivolvus</i> , Case.	111	109. <i>Ancylus diaphanus</i> , Hald.	141
<i>Helisoma</i> , Swains.	112	110. <i>Ancylus haldemani</i> , Bourg.	141
87. <i>Planorbis ammon</i> , Gld.	112	111. <i>Ancylus sallei</i> , Bourg.	142
88. <i>Planorbis tenuis</i> , Phil.	113	112. <i>Ancylus parallelus</i> , Hald.	142
89. <i>Planorbis corpulentus</i> , Say.	114	113. <i>Ancylus rivularis</i> , Say.	142
90. <i>Planorbis trivolvus</i> , Say.	115	114. <i>Ancylus tardus</i> , Say.	143
91. <i>Planorbis truncatus</i> , Miles.	121	115. <i>Ancylus calcarius</i> , De K.	143
92. <i>Planorbis fragilis</i> , De K.	122	116. <i>Ancylus patelloides</i> , Lea	144
93. <i>Planorbis lautus</i> , H. Ad.	123	117. <i>Ancylus kootaniensis</i> , Baird.	144
94. <i>Planorbis bicarinatus</i> , Say.	123	118. <i>Ancylus caurinus</i> , Coop.	144
95. <i>Planorbis antrosus</i> , Con.	125	119. <i>Ancylus newberryi</i> , Lea.	145
<i>Menetus</i> , H. & A. Ad.	125	120. <i>Ancylus crassus</i> , Hald.	145
96. <i>Planorbis opercularis</i> , Gld.	125	121. <i>Ancylus fragilis</i> , Tryon.	146
97. <i>Planorbis exacutus</i> , Say.	126	122. <i>Ancylus ? filusus</i> , Con.	147
<i>Gyraulus</i> , Ag.	128	123. <i>Ancylus borealis</i> , Morse.	156
98. <i>Planorbis vermicularis</i> , Gld.	128	<i>Acroloxus</i> , Beck.	147
99. <i>Planorbis deflectus</i> , Say.	129	124. <i>Acroloxus nuttallii</i> , Lea.	147
100. <i>Planorbis dilatatus</i> , Gld.	131	125. <i>Acroloxus ovalis</i> , Morse.	156
101. <i>Planorbis albus</i> , Mull.	132	<i>Gundlachia</i> , Pfr.	148
102. <i>Planorbis parvus</i> , Say.	133	126. <i>Gundlachia californica</i> , Rwl.	149
103. <i>Planorbis arcticus</i> , Beck.	135	127. <i>Gundlachia meekiana</i> , Stimp.	150
<i>Segmentina</i> , Flem.	136	SUBORD. THALASSOPHILA.	152
<i>Planorbula</i> , Hald.	136	SIPHONARIIDAE.	152
104. <i>Segmentina wheatleyi</i> , Lea.	136	<i>Siphonaria</i> , Blainv.	152
105. <i>Segmentina armigera</i> , Say.	137	128. <i>Siphonaria alternata</i> , Say.	153
ANCYLINAE.	138	129. <i>Siphonaria aequilirata</i> , Cpr.	153
<i>Ancylus</i> , Geof.	138	130. <i>Siphonaria amara</i> , Rve.	154
106. <i>Ancylus obscurus</i> , Hald.	139	131. <i>Siphonaria lecanium</i> , Phil.	154

## LAND AND FRESH-WATER SHELLS

O F

NORTH AMERICA.

II.

PULMONATA.

SUBORDER LIMNOPHILA

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

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

## FAMILY AURICULIDAE

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

Fig. 1

Lingual dentition of *Alexia myosotis*.

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

<sup>1</sup>See *Alexia myosotis*, p. 4

(1)

(PAGE 2)

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

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

Animal usually frequenting salt marshes.

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

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

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

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

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

(PAGE 3)

*Melampus obliquus* is referred by Say to South Carolina. *Alexia myosotis* was probably introduced from Europe; I have never known of its being found south of New York harbor. *Carychium exiguum* will probably be found in all the States. The other species are confined to

the coast of Florida and the Gulf of Mexico, some of them being common to Cuba and other West Indian Islands.

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

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

#### SUBFAMILY AURICULINAE.

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

#### AURICULA, Lamarck.

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

#### SPURIOUS SPECIES

*Auricula bidentata*, Gld &c. is the same as *Melampus*.

*Auricula biplicata*, Desh., is the same as *Melampus bidentatus*.

*Auricula cingulata*, Pf. &c., is the same as *Tralia*.

*Auricula cornea*, Desh., is the same as *Melampus bidentatus*.

*Auricula denticulata*, Gld, DeK., is the same as *Alexia myosotis*.

*Auricula floridana*, Shuttl., is the same as *Tralia*.

*Auricula jaumei*, Mitre, is the same as *Melampus bidentatus*.

*Auricula obliqua*, DeK., is the same as *Melampus obliquus*.

*Auricula sayii* Küster, is the same as *Leuconia sayii*.

*Auricula stenostoma*, Küster, is the same as *Tralia cingulata*.

*Auricula bidens*, Say of Pot. et Mich. Mr. Say never described any such species.

(PAGE 4)

#### ALEXIA, (LEACH), GRAY.

Foot simple beneath, without a transverse groove. Fig. 2  
Jaw narrow, slightly arcuate, extremities but little attenuated, striae obsolete, scarcely any median projection. Lingual dentition, see p. 1, Fig. 1. Fig. 3

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

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

*Alexia myosotis*, Draparnaud. — Shell elongate-oval, thin, semi-transparent, smooth and shining; dark horn-color, with a narrow reddish sutural line; spire produced with an acute apex; suture distinctly impressed; whorls from seven to eight, the upper ones rather convex, the last one elliptically ovate, equalling five-sevenths of the shell's length;

Fig. 4 aperture subvertical, about four-sevenths of the shell's length; peristome somewhat expanded and thickened, sometimes furnished with tooth-like folds on its inner side; its basal termination appressed to the shell, slightly reflected over a minute perforation, and turning upwards till it blends with the columellar fold, which winds into the aperture; the parietal wall is furnished with a white, transverse, thin, and sharp denticle, and a second smaller, much less prominent one, placed above it. Greatest diameter 4, length 8 millimetres.

*Auricula myosotis*, Draparnaud, &c.

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

<sup>1</sup> From Moquin-Tandon.

(PAGE 5)

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

*Melampus borealis*; Conrad, Am. Journ. Sc., **21**, XXIII, 345 (1833).

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

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

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

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

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

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

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

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

by Moquin-Tandon. Pfeiffer considers them distinct, as does also Reeve.

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

(PAGE 6)

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

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

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

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

Cat. No.<sup>1</sup> No. of Sp. Locality. From whom received. Remarks.

8743 - 4 - Massachusetts. - W. G. Binney. - Cabinet series.

8799 - 12 - Massachusetts. - W. Stimpson. - ...

#### CARYCHIUM, Müller.

Fig. 5 Foot not transversely divided beneath.

Shell pupa-shaped, very thin, transparent, with but few whirls; aperture suboval; with one dentiform columellar fold, sometimes

<sup>1</sup> In the original, materials under these headings are arranged in tabular form. To save space here, the arrangement is changed somewhat but all the text is reproduced. AL



obsolete; parietal wall with 1 or 2 teeth; peristome expanded, terminations not approximating, the right hand one with one internal tooth.

Jaw slightly arched; without ribs  
Fig. 6 or marginal denticulations, hardly striated towards the margin.

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

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

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

(PAGE 7)

convex, very oblique, with transverse striae, suture distinct, impressed;  
Fig. 7 aperture obliquely oval, Fig. 8 white, with a prominent plait on the columellar margin, about midway between the extremities of the lip, and a slightly prominent fold near the junction of the lip with the umbilical extremity of the shell; lip thick, reflected, flattened; umbilicus perforated. Length  $1 \frac{3}{5}$ , diam.  $\frac{3}{4}$  mill. Aperture  $\frac{1}{2}$  mill. long.

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

*Bulinus exiguus*, Binney, Terr. Moll. II, pl. liii, f. 1.

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

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

*Carychium existelium*, Bourguignat, l.c. 220.  
*Carychium euphoeum*, Bourguignat, l.c. 221.

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

Animal colorless; tentacles stout, hyaline, one-third the length of the foot. The foot is short, thick, distinctly divided into two segments,<sup>1</sup> the anterior of which is bilobed, and projects, when the animal Fig. 9. is in motion, considerably in advance of the head. Eyes oval, situated on the back, near the base of the tentacles. Its motions are very sluggish. It carries the shell directed horizontally; the shell is so transparent that the viscera of the animal may be seen through it.

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

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

<sup>1</sup> This does not agree with the generic description of *Carychium*.

(PAGE 8)

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

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

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

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

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

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

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

Lingual dentition (see p. 6).

Cat. No. 8440; No. of sp. 7; Locality . . . .  
From whom received: . . . .; Remarks: . . . .

#### SPURIOUS SPECIES

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

(PAGE 9)

#### SUBFAMILY MELAMPINAE

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

#### MELAMPUS, Montf.

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

Jaw ----- ?

Lingual membrane ----- ?

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

*Melampus olivaceus*, Cpr.—Shell small, rather smooth, conical; spire depressed, obtusely angulated below the suture, which does not distinctly separate the whirls; color dirty

white, with irregular patches or revolving lines of dark red or purplish; epidermis olive-colored; on young or very fresh specimens there are sometimes microscopic revolving lines near the base of the shell, and on the spire, which cross the delicate lines of growth so as to present under the microscope a granulated surface; whirls seven to nine, the upper ones distinguished only by means of the lens, and flattened; aperture long, equalling 11/13 of the shell, edge variegated in color by the termination of the reddish bands on the white ground of the shell, within white; the outer lip is furnished with numerous sharp, white laminae, in the specimens before me varying from 1 to 9; the parietal wall of the aperture is covered with an almost imperceptible shining, callus; there is one constant, prominent, elevated white tooth-like lamina revolving within the shell, which is usually placed within two smaller shorter ones; on the columella there is also a stouter lamina entering into the aperture, and passing outwards and curving downwards so as to join the termination of the labium. Length 13, diam. 18 mill.

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

San Diego to Mazatlan (Reigen Cat.).

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

(PAGE 10)

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

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

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

8366	1	W. Coast	.....	.....
3414	9	"	.....	.....
8550	3	"	.....	Cabinet series

*Melampus bidentatus*, Say. — Shell imperforate, elliptically-ovate, rather thin, shining when perfect, but usually found much eroded; the surface is marked with longitudinal wrinkles, and very minute revolving striae; horn-color, or grayish-red, often

Fig. 11. with revolving, narrow ru- Fig. 12. fous bands, four or five in

number; suture well marked; spire short, and usually obtuse, often somewhat eroded; whirls usually six, the upper ones flattened, the body whirl equalling about 5/6 of the entire length of the shell, and obtusely angulated at its greatest width; aperture hardly oblique, very long and narrow, enlarging gradually towards the base, about 5/7 the length of the shell; peristome very thin and sharp, not reflected, on the interior furnished with no laminae, or with from one to seven; these laminae are elongated, white, and do not reach the margin; they are usually separate, placed at irregular intervals, but sometimes are found on a longitudinal elevated, white callus; they enter but a short distance into the aperture; the parietal wall of the aperture is covered with a thin, shining, enamel-like callus, and bears on its lower half a single, white, prominent and transverse tooth, entering into the aperture; the columellaris is also furnished with a white, tooth-like fold, commencing at the termination of the sharp peristome, and revolving upwards into the interior of the shell; this fold does not extend far into the aperture, as all the internal whirls and axis of the shell are early absorbed by the animal.

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

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

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

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

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

(PAGE 11)

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

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

*Auricula jaumei*, Mitre, Rev. Zool. (Mars, 1841), 66,

*Auricula buplicata*, Deshayes, Encycl. Méth. II, 91.

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

*Melampus bidentatus*,  $\beta$ , Pfeiffer, Mon. Auric. 46.—Var. a: DeKay, l.c.

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

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

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

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

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

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

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

(PAGE 12)

lines are commonly found on young specimens DeKay mentions this as var.  $\alpha$ , Pfeiffer as  $\beta$ . The latter author also describes a var.  $\gamma$ :-

Last whirl sub-excavated below Fig. 13. the suture, minutely spirally striated; lip with a white ridge of callus within the dark-colored margin, with from 6-10 regular folds.

Georgia. (Pfeiffer.)

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

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

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

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

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

Cat. No. - No. of Sp. - Locality. - From whom received. - Remarks. [None in this list. ALI

8436 - 8 - Georgia. - Dr. J. Lewis. ....  
8437 - 8 - Indianola, Tex. - G. Wurdemann. ...  
8438 -12 - Charleston, S.C. - Lieut. Kurtz.  
8439 -10 - Indianola, Tex. - .....  
8441 - 3 - Charleston, S.C. - Lieut. Kurtz.  
8800 -20+ - St. Simon's Island, Ga. ....  
8801 -100? Massachusetts. - W. Stimpson. ...  
8804 - 5 - Key West. ....  
8832 -11 - Indian Key, Fla. - G. Wurdemann.  
8823 - 3 - Texas. - Capt. Pope. ....

*Melampus flavus*, Gmel. -- Shell imperforate, obconic, smooth, chestnut-colored, Fig. 14. with three light, narrow bands; spire short, convex conic; suture slightly impressed; whirls from nine to ten, the upper ones flattened, the last about equalling three-fourths of the length of the shell, arcuately ridged below; aperture subvertical, narrow, angulated below; one deep parietal fold, one subvertical, stout, columellar fold, extended towards the base; peristome straight, acute, its outer margin reddish, thickened with white within and fur-

(PAGE 13)

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

Lister, Hist. t. dcccxxxiv, f. 60. -- Favanne, Conch. t. lxx, f. H, i.

*Auricula midae parva*, &c., Mart. & Chemn. II, 119, 126, t. xliii, f. 445.

*Voluta*, n. 106; Schröter, Einl. I, 272.

*Voluta flava*, Gmelin, Syst. 3436, No. 5. -- Dillwyn, Cat. I, 506, n. 17.

*Voluta flammea*,  $\gamma$ , Gmelin, l.c. 3435, n. i.

*Bulimus monile*, Bruguiere, Encycl. Méth. I, 338, n. 70.

*Melampa monile*, Schweigger, Handb. 739.

*Conovulus monile*, Goldfus, Hand. 657.

*Conovulus flavus*, Anton, Verz. 1776.

*Auricula monile*, Ferussac, Podr. 105. -- Lamarck, An. sans Vert. VI, 2, 141; ed. Desh. VIII, 333. -- Küster in Chemn. ed. 2, Auric. 30, pl. iv, f. 7-9.

*Auricula flava*, Deshayes in Lam. VIII, 33. -- Petit Journ. Conch. II 427 (1851).

*Auricula confinis*, Orbigny, Moll. Cuba.

*Melampus monile*, Lowe, Zool. Journ. V, 292.

*Melampus flavus*, Adams, Congr. 42, 186.—Poey, Mem. I, 394.—Pfeiffer, Mon. Auric. Viv. 21; Br. Mus. Auric. 14.—W. G. Binney, T. M. IV, 186, wood-cut.

*Melampus torosa*, Mörch, Cat. Yoldi, 38.

*Melampus mentis*, Shuttleworth, Diag. 7, 162.

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

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

*Melampus coffea*, Lin.—Shell imperforate, cone-shaped, very solid and heavy, smooth and shining in fresh specimens, with delicate wrinkles of growth, and very numerous microscopic revolving lines; Fig. 15. light fawn-color when deprived of its russet epidermis, with three or four revolving bands of white on the body whorl, of which the uppermost is broadest; suture moderate; spire short, conic, apex black, shining, pointed; whorls from nine to ten, the upper ones flattened, the last obtusely angulated below the suture, 17/19 the length of the entire shell; aperture subvertical, long and narrow, gradually widening towards the base of the shell, about 16/19 the entire length of the shell; peristome acute, not reflected, but thickened within by a heavy white callus, extending as high up as the carina of the body whorl; on this callus are from fifteen to twenty-two white, transverse laminae or ridges, not reaching the edge of the peristome, and not

(PAGE 14)

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

*Bulla coffea*, Linnaeus, Syst. Nat. X, 729.

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

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

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

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

*Bullus conformis*, Brüguere, Encycl. Méth. I, 339,

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

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

*Melampa minuta*, Schweigger, Handb. 739.

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

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

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

*Convolvus conformis*, Lamarck, Encycl. Méth., t. ccclxix, f. 2 (no desc.).—Woodward, Man. Moll. 173, t. xii, f. 37 (1854).

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

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

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

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

(PAGE 15)

(PAGE 15)

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

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

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

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

8821 - 5 - Indian Key, Fla. - G. Wurdemann. -

Cab. ser. Var. and sp. dist.? Vide T.M. IV.

8824 - 1 - Texas. - Capt. Pope. - Cab. ser.

Var. and sp. dist.? Vide T.M. IV.

## SPURIOUS SPECIES OF MELAMPUS.

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

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

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

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

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

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

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

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

It is not now known what shell Say had in view when the above description was

written. No authentic specimen is preserved, and no author has seen any shell from that locality answering to the characters laid down. DeKay mentions it among the extra-limital species in his report, his words being nearly a repetition of Say's. Pfeiffer repeats Say's words and suggests the identity of the species with *Melampus coffea*: Say being familiar with that shell (*M. conformis*, vide ed. Binn. p. 85), it seems hardly probable he would have described a variety of it.

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

(PAGE 16)

## FOSSIL SPECIES.

*Melampus priscus*, Meek, Phila. Acad. Nat. Sc. 1860, 315.

*Melampus (Ensiphorus) longidens*, Conrad, Pr. A. N. Sc. Phila. 1862, 584.

## TRALIA, Gray.

Foot posteriorly acute, entire.

Fig. 16. Shell ovate, smooth; spire elevated; aperture narrow, linear, dilated anteriorly; inner lip usually with three oblique plaits; outer lip acute, sinuated posteriorly, internally with one or more transverse, elevated ridges.

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

*Tralia floridana*, Shuttl.—Shell imperforate, ventricose, fusiform, thin, smooth, grayish, with varying chestnut bands;

Fig. 17. spire regularly conic, acute; suture linear; whorls ten, flattened, the upper ones radiately striate, the last comprising three-fifths of the length of the shell, obsoletely angulated above, and very much smaller at its base; aperture subvertical, narrow, angular; two parietal plicae, one strong, one on the columella; obliquely continued towards the base; peristome acute, its right side in adult specimens armed with transverse, white, subequal folds, its columellar

portions both short and callous. Length  $7\frac{1}{2}$ , diameter  $4\frac{1}{3}$ ; aperture in length almost 5, in breadth  $1\frac{1}{3}$  millimetres.

*Auricula floridana*, Shuttleworth, MSS.

*Melampus floridanus* (*Tralia*), Adams, Pr. Zool. Soc. II, 1854 (no desc.).—Pfeiffer, Malak. Blatt. (1854); Mon. Auric. Viv. 36; Brit. Mus. Cat. 25.—W. G. Binney, T. M. IV. 165, pl. lxxv, f. 30.

Found at Florida Keys.

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

I do not know what species this represents. It was drawn from nature by Dr. Stimpson, in Charleston harbor. [Footnote refers to Fig. 16, on this page. A.L.]

(PAGE 17)

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

*Auricula midae parva fusca unicolor*, Martini &

Chemnitz, II, 119 t. xliii, f. 446.—Favanne, t. lxxv, f. H, 4 (teste Pfr.).

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

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

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

*Bulinus ovulus*, Bruguiere, Encycl. Méth. I, 339.

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

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

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

*Auricula pusilla*, Deshayes in Lam. VIII, 332.

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

*Conovulus pusillus*, Anton, Verz. 48.

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

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

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

This species is well known in cabinets by specimens from the

(PAGE 18)

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

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

*Tralia cingulata*, Pfr.—Shell imperforate, fusiform, heavy and thick, shining polished, with numerous microscopic revolving lines, most prominent on the last whirl; brownish with numerous irregularly wide, white revolving bands; spire convex-conic, terminating in an acute transparent

point; suture simple; whirls ten, the upper ones flattened and narrow, the last one tapering towards the base, and equalling about two-thirds the length of the shell; aperture hardly oblique, very narrow, divided at its base by a stout, sharp columellar fold, which ascends and winds obliquely into the aperture; peristome simple, acute, armed within with from six to eight elongated laminae, not quite reaching the edge of the lip, the lower one being most fully developed. Length of the specimen before me 11, breadth 5; length of aperture 6 millimetres.

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

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

*Auricula stenostoma*, Küster, olim, in Inc. ds 2a (ifeP) E. F. Ft tes RE f4.

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

*Tralia*, H. & A. Ad.

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

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

#### LEUCONIA, Gray.

Foot divided inferiorly by a transverse groove.

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

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

(PAGE 19)

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

*Leuconia sayii*, Küster.—Shell small, conic-ovate, shining, horn-colored, striate; spire acute, broadly conic, whirls five; rather convex; aperture oblong, columella biplicate. Length  $2\frac{1}{2}$  lines, diam.  $1\frac{1}{2}$ .

United States. (Küster.)

*Auricula sayii*, Küster in Chemn. Fig. 20. ed. 2, 12, pl. vi, f. 14, 15.

*Leuconia sayii*, Pfeiffer, Mon. Auric. 157; Brit. Mus. Auric. 170.—W. G. Binney, Terr. Moll. IV, 177, pl. lxxv, f. 34.

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

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

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

#### PEDIPES, Adanson.

Foot divided inferiorly by a transverse groove.

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

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



(PAGE 20)

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

*Pedipes lirata*, W. G. Binney.—Shell imperforate, globose-conic, solid, shining, straw-colored, regularly marked with revolving ridges; spire short, depressed, apex obtuse; whirls three, the upper ones short, the lower

Fig. 21. er one about equalling five-sixths the length of the shell; aperture semicircular, its parietal wall covered with shining callus, and furnished with a thick, elevated, hooked and entering fold; columella furnished with two thick, acute, tooth-like processes, placed side by side; peristome acute, furnished on its interior with a shining callus, which is protracted into a high tubercle at its middle. Greater diameter  $2\frac{1}{2}$ , length  $3\frac{1}{3}$ ; length of the aperture  $2\frac{1}{2}$  mill.

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

Cape San Lucas, Lower California.

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

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

#### BLAUNERIA, SHUTTL.

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

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

But one species of this genus is known, the *B. pellucida*. It is one of those shells whose generic position cannot be ascertained without a knowledge of the characters of the animal. It was placed among the *Helicidae* as *Achatina* and *Tornatellina*, as a *Glandina* among the *Ole-*

*acinidae*, and among the *Pectinibranchiata* as *Odostomia*; until it was ascertained by Dr. Gundlach to belong to the *Auriculidae*.

(PAGE 21)

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

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

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

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

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

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

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

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

#### SPURIOUS SPECIES OF AURICULIDAE.

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

#### Family OTINIDAE.

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

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

Animal amphibious, living near the sea.

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

(PAGE 22)

#### SPURIOUS SPECIES OF OTINIDAE.

*Velutina zonata*, Gould, whose Fig. 23. figure I copy (Invert. p. 242), is referred to this family under the name of *Morvillia zonata*, Gray (see Gen. Rec. Moll. II, 645). It is a deep-water shell, without doubt belonging to *Velutina*. Pfeiffer describes it also among the *Otinea*, as *Otina zonata* (Mon. Auric. p. 12).

#### FAMILY LIMNAEIDAE.

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

(Fig. 24.)

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

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

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

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

(PAGE 23)

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

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

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

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

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

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

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

(PAGE 24)

## SUBFAMILY LIMNAEINAE

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

## LIMNAEA, Lamarck.

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

Fig. 25. Jaws three, smooth; one upper, large, transversely oblong or ovate; two lateral, rudimentary, narrow, convex.

Lingual membrane (of *L.*  
Fig. 26. *columella*) broad; teeth Fig. 27.  
crowded, numerous; central  
narrow, long, apex attenuated, recurved; laterals broad, blunt, apex recurved, denticulated.

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

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

The name *Limnaea* (is now universally adopted for this genus.

(PAGE 25)

It is useless, therefore, to refer here to the thirty synonyms quoted by Hermannsen.<sup>1</sup>

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

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

Inhabits Lake Superior.

Fig. 28.

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

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

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

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

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

This species ranges from Vermont, through the northern tier

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

(PAGE 26)

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

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

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

There is a species of this genus which resembles the *stagnalis* of Europe: we have named

it *Limnaea jugularis*. Whirls about six, tapering; mouth within often brownish, lip white, column a little contracted in the middle; we have not a good specimen to describe or figure. (Say, *Nich. Encycl. first ed.*)

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

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

(PAGE 27)

Adams and DeKay describe Fig. 29. *appressa* as a distinct species. Fig. 30.

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

After leaving Trumbull, we enter Portage County (Ohio). In this county we found a number of beautiful ponds, from each one of which flows a perennial stream. One which lies a few miles south of our route, in Stark County, called Congress Lake, was, until recently, the only known locality of the fine univalve shell, *Limnaea stagnalis*. It was discovered by Dr. K. in the course of the last season. I have one in my possession which is two inches in length, with the body whirl three-fourths of an inch in diameter. As this rare and elegant shell has not been figured or described by any American Conchologist, a drawing is given at fig-

ure 10. The description is copied from Dillwyn and appears to be so similar to that of our own shell, that there can be no doubt of its identity with the European species, although it is a rare fact, and which scarcely again occurs in all our long list of land and freshwater shells. Geoffroy calls it 'Le Grand Buccin.' (Kirtland.)

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

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

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

(PAGE 28)

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

Animal ----- ?

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

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

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

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

Fig. 32 represents the lingual dentition of an American specimen of *Limnaea jugularis*. The

(Fig. 32.)

central tooth is small, narrow, conical. There are 40:1:40 teeth, arranged in a transverse, curving row, of variable form. There are 103 rows in all.

<sup>1</sup> Rather *L. ampla*.

(PAGE 29)

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

8301	5	Michigan.	.....	
8306	5	Ruby Valley.	Capt. J. H. Simpson.	
8307	4	.....	W. Stimpson.	
8479	3	Lake Champlain.	W. G. Binney.	
			Cabinet series.	
8954	3	Ft. Simpson.	Br. Am. R. Kennicott.	
9063	30+	Hudson's Bay.	Drexler.	
9067	50+	Grand Rapids, Mich.	Dr. J. Lewis.	
8959	..	Ft. Resolution	R. Kennicott.	
9135	5	Ft. Simpson.	"	
9140	5	Moose Factory.	Drexler.	
9175	50+	Vermont.	J. E. Chittenden.	
9182	2	Black River, N. Y.	Gen. Totten.	
9165	4	Milwaukee.	I. A. Lapham.	
9154	6	Cayuga Inlet.	Mrs. H. W. Parker.	
8425	3	Milwaukee, Wis.	I. A. Lapham.	

- 8246 3 Michigan . . . . .  
 8462 3 Southern Utah; Capt. J. H. Simpson. In al. with animals.  
 8473 2 Milwaukee, Wis. I. A. Lapham.  
 9285 5 Isle la Crosse. R. Kennicott.  
 9287 1 Otter Tail Creek, Minn. "  
 9290 20+ Great Slave Lake. R. Kennicott.  
 9248 3 Lake Superior. Dr. J.S. Newberry.  
 9250 2 " "  
 9252 5 Rhett L., Cal. "  
 9244 5 . . . . .  
 9322 4 E. of Ft. Colville, W.T. N.W. Bound. Surv.  
 9325 12 Near Ft. Anderson, lat. 68° R.R. McFarland.

*Limnaea lepida*, Gould.—Shell very fragile, elongated, very acutely conical, subumbilicate, pale horn-color; whirls five, oblique, moderately convex, forming an acuminate spire; suture moderately impressed; surface smooth and shining, lines of growth faint, and when examined by a magnifier they are found to be rendered somewhat zigzag by distant, revolving furrows, which cross them. Aperture large and expanded, nearly semicircular, half the length of the shell; Fig. 33. outer lip expanded; columella having a very strongly marked sharp fold, and broadly covered with a thin callus, which not being closely appressed at the umbilical region, leaves a small chink. Length  $3/5$ , breadth  $1/4$  inch.

Lake Vancouver, Oregon.

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

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

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

(PAGE 30)

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

Subgenus RADIX, Montf.

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

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

*Limnaea ampla*, Mighels.—Shell large, much inflated, suboval, rather thin, composed of five convex whirls, prominently shouldered at the upper part; epidermis of an obscure olivaceous green color; lines of accretion very fine and compact; transverse lines obscure, appearing serriform under a magnifier, giving the surface the appearance of very delicate lace work; suture deep, and in one specimen subcanaliculate; spire short and pointed when present; aperture oblong, very wide at the posterior part, but narrowing rapidly anteriorly and occupying rather more than two-thirds the length of the shell; labrum thin and somewhat reflected; labium broadly reflected, forming and partially covering an open and very deep umbilicus; columella fold very prominent; within it is of a light yellowish fawn color, with an obscure purplish zone, one line in breadth, and about two lines within the aperture. Length 1.3, breadth 1, height .8 inches. Divergence of the spire very variable.

Fig. 34.

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

This extraordinary and beautiful species was discovered by Mr. Alexander W. Longfellow, civil engineer, while engaged with other gentlemen of the scientific corps in the exploration.

tion and survey of the northeastern boundary, in the summer of 1842. He informs me they were very abundant on the shore of the lake, but he had no means of preserving any more than four specimens, all of which are in my collection. No two of

(PAGE 31)

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

*Limnaea ampla*, Mighels, Bost. Journ. N. H. IV, 347, pl. xvi, f. 1, a, b, c (Apr. 1843); Proc. I, 129 (Oct. 1843), not of Hartmann.<sup>1</sup>—Whiteaves, Can. Nat. (Apr. 1863), VIII, 112, f. 11.

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

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

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

..... British America. Kennicott. ....  
9283 50+ Isle La Crosse " .....

*Limnaea decollata*, Mighels.—Shell very ventricose, rather thick, subovate or subrotund, in outline an irregular rhomboid; epidermis of

an olivaceous green color, rather thin, deciduous; whirls two to three; Fig. 36. spire very short, generally decollated; whole surface generally rather rough; striae of growth coarse and fine alternately; transverse striae on the body whirl sparse, interrupted, sometimes obsolete; body whirl composes almost the whole shell; aperture very large, subcampanulate; its length is very little greater than the breadth, and occupies more than two-thirds the length of the shell; labrum rather thin, simple; fold of the columella very prominent. Length 16, breadth .5, height .4 inch.

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

(PAGE 32)

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

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

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

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

*Limnaea catascopium*, Haldeman, part, Mon. 52, pl. xiv, f. 1-3 (1842).

*Limnaeus decollatus*, Küster in Ch. ed. 2, 45, pl. viii, f. 11-14.

Found around Lake of the Woods, Fig. 37. in Maine and Connecticut.

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

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

8300 9 Lake of the Woods. R. Kennicott. ...  
8481 1 Maine. W.G. Binney. Cabinet series.  
9132 6 " Haldeman. From Mighels.

*Limnaea columella*, Say.—Shell thin, fragile, horn-color; whorls four, longitudinally wrinkled. Spire prominent, acute. Suture not much impressed. Aperture dilated, ovate. Columella much narrowed near the base, so that the view may be extended from the base almost to the interior apex of the shell. Length 7/10 of an inch nearly, of the spire ¼ inch.

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

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

(PAGE 33)

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

This species is allied to *L. ca-* Fig. 38. *tascopium* of the American edition of Nicholson's Encyclopedia, but the revolution of the whorls is more oblique, the shell thinner, the aperture more dilated, and the columella differently formed. For several specimens of this shell I am indebted to Mr. Titian Peale.

Var. *a*. Small, black. From Cold Water Creek of the Missouri. This is most probably a dis-

tinct species; we obtained but a single specimen of it. (Say.)

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

*Limnaeus columella*, Küster in Ch. ed. 2, 44, pl. viii, f. 3-5.

*Limnaea chalybea*, Gould, Am. Journ. Sci. [1], XXXVIII, 196 (1840); Otia, 180.

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

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

*Limnaea acuminata*, Adams, Am. Journ. Sc. [II], XXXIX, 374 (1840).

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

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

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

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

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

*Limnaea succiniformis*, Adams MS. teste Haldeman.

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



(PAGE 34)

*Limnaea macrostoma*, Say.— Shell suboval; whirls five, body whirl somewhat reticulated; suture not profoundly indented; spire Fig. 39. about two-thirds the length of the aperture, acute; aperture much dilated; labrum not thickened on the inner submargin.

Inhabits Cayuga Lake. Length  $\frac{1}{2}$  inch, and upwards.

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

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

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

New Bedford.

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

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

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

This shell, which I found two Fig. 40. years in succession in a muddy pool in Cambridge, I thought was sufficiently distinct to be regarded as a new species; and I accordingly gave it

(PAGE 35)

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

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

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

Hab. Environs of Philadelphia. (Valenciennes.)

Finally, an examination of the specimens from which Mr. Lea drew his descriptions of *Limnaea strigosa*, *coarctata*, and *casta*, have convinced me of their identity with *L. columella*. In the case of the second species Haldeman agrees with me, he makes no mention of

the others. Mr. Lea's descriptions are copied below, and a figure given of each of the three forms, drawn from his types.

*Limnaea strigosa*, Lea.—Shell long-oval, somewhat oblique, diaphanous, striate, horn-colored, thin, imperforate; spire short; sutures impressed, whirls five, somewhat convex; aperture ovate. Fig. 41.

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

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

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

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

(PAGE 36)

*Hab.* Newport, Rhode Island: Col. Totten, United States Army. My cabinet and Fig. 42. cabinet of Col. Totten. Diam. .30, length .55 of an inch.

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

*Limnaea casta*, Lea.—Shell subfusiform, rather thick, closely striate, yellow,

Fig. 43 perforate; spire rather elevated, acuminate; sutures impressed; whirls six, convex; aperture large, ovate.

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

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

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

Fig. 44

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

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

(PAGE 37)

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

Cat. No.;	No. of Sp.;	Locality.;	From whom received;	Remarks.
8295	3	Ohio. ....		
8296	7	St. Simon's Island. Ga. ....		

- 8297 1 Marietta, O. W. Holden .....  
 8298 9 South Carolina. W. Stimpson. ....  
 8299 5 ..... W.G. Binney. Var. *chalybea*,  
 Gld.  
 8482 2 ..... W.G. Binney. Cabinet series.  
 9139 12 St. Simon's, Ga. Postell. ....  
 8979 San Felipe Spr. Capt. Beale. ....  
 8522 1 ..... Ac. N. Sc. Phila. Marked *L.*  
*macrostoma* by Say.  
 9251 9 Massachusetts. .... *strigosa*,  
 teste Lea.

Subgenus *BULIMNEA*, Hald.

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

*Limnaea megasoma*, Say.—Large, dilated sub-oval; spire short, rapidly diminishing, acute; whirls about five, rounded, obtusely wrinkled across; body whirl lar- Fig. 46. ge, the wrinkles very obvious, suture deeply impressed; aperture subovate, much longer than the spire, within chestnut-brown; columella white. Length more than one and six-tenths of an inch; greatest diameter one inch.

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

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

(PAGE 38)

*Limnaea megasoma*, Haldeman, Mon. 13, pl. iii, f. 1-3 (1841).—Adams, Shells of Vermont; Thoms. Vt. 153, excl. fig., pamphlet, Fig. 47. p. 3 (1842).—DeKay, N. Y. Moll. 70 pl. iv, f. 70 (1843).

*Bulimnea megasoma*, Chenu, Man. de Conch. III, 480, f. 3543.

This is a northern species, ranging from Lake Champlain to Michigan. The shell, by which

it is commonly represented in collections, corresponds perfectly with Mr. Say's types in the Philadelphia Academy. His description and figure are copied above (Fig. 46).

Prof. Adams' figure does not represent this species.

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

- 8253 1 Burlington, Vt. ....  
 8254 6 Lake Champlain. W. Stimpson. ....  
 8487 2 " " " Cabinet  
 series.  
 9249 4 Lake Superior. Dr. J. S. Newberry.

Subgenus *LIMNOPHYSA*, Fitz.

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

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

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

(PAGE 39)

Inhabits Lakes Erie and Superior. Total length  $13/10$ ,<sup>1</sup> of the aperture  $11/20$  of an inch.

This shell is remarkable for its narrow and elongated form, and for Fig. 48.

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

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

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

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

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

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

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

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

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

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

1 Probably 1 3/10 inch.

(PAGE 40)

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

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

*Limneus elongatus*.—Shell horn-color, tinged with reddish-brown; spire elongated, tapering, acute; whirls six or seven, slightly convex, wrinkled across; body whirl, measured at the back, more than half the total length; Fig. 49. suture moderately indented; aperture less than half the length of the shell; labium with calcareous deposit. Length one and three-tenths inch.

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

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

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

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

*Limnaea exilis*.—Shell attenuated, very thin, longitudinally striate; whirls seven,

plano-convex, columella reflected; aperture ovate oblong.

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

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

(PAGE 41)

haps, the reflection of its labium which is not laid on the body of the Fig. 50. whirl. Where it joins above with the labrum, the angle is quite acute, and is separated from the body whirl. The specimen figured was not taken alive, and the epidermis being destroyed, the description and representation are partially defective. The aperture is about two-fifths the length of the shell. (*Lea*.)

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

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

*Limnaeus palustris*, var.

Fig. 51. var. *distortus*, of Ross- Fig. 52. massler, is a form of this species, as shown by his figure, of which a fac-simile is here given. (Fig. 52).

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

8224	8	Milwaukee, Wis.	I.A. Lapham	.....
8225	4	Big Sioux	.....	.....
8226	16	Illinois	.....	.....
8227	7	.....	.....	.....
8228	8	Goose Island, Mich.	.....	.....
8229	26	Big Sioux	.....	.....
8230	8	Milwaukee, Wis.	I.A. Lapham	.....
8231	20	.....	.....	.....
8232	1	St. Clair River	.....	.....
8233	3	.....	.....	.....
8234	7	Farwell's Mills, Madison, Wis.	Prof. S. F. Baird	.....
8235	1	Illinois	.....	.....

8236	1	Illinois	.....	.....
8236	7	Prairie Lke, n. Red Riv.	R. Kennicott	.....
8237	2	Toledo, O.	F. A. Bossard	.....
8238	3	Ohio	Dr. J. Lewis	.....
8239	11	Goose Island, Mich.	.....	.....
8240	8	Milwaukee, Wis.	.....	.....
8241	4	Illinois	Dr. J. Lewis	.....
8242	13	Grindstone Creek	.....	.....
8243	15	Ft. Peirce	.....	.....
8491	1	Aztalan, Wis.	Prof. S.F. Baird	Cabinet series
8319	6	.....	.....	.....
8521	5	.....	.....	Cabinet series
3523	3	Pacific Coast	.....	Cabinet series
8734	2	San Francisco	Rowell	.....
9066	200+	Milwaukee	Lewis	.....
9139	20+	.....	.....	.....

(PAGE 42)

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

Inhabits Mexico.

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

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

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

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

In describing the habitat of *Planorbis tenuis*, in Chemnitz, ed. 2, *Limnaeus subulatus*

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

Shell imperforate, subulate-turreted, solid, striated, reddish horn-color; spire elongate, subulate, acuminate; whirls seven, flattened; aperture Fig. 55. semioval, yellowish-red, sanguineous at the base; peristome straight, sharp, oblique, with a distinct columellar fold. (*Dunker.*)

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

(PAGE 43)

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

Cat. No.;	No. of Sp.;	Locality;	From whom received;	Remarks.
8294	7	City of Mexico.	.....	.....
8283	5	"	.....	.....

*Limnaea sumassi*, Baird.—Shell elongate, attenuated, horn-colored, fragile; whirls six, the last twice the size of the remainder; aperture moderate; columella Fig. 56, strongly plicate; external Fig. 57, surface with microscopic, crowded, very minute decussations. Length of largest  $1\frac{1}{6}$ , breadth  $\frac{1}{2}$  inch.

*Hab.* Sumass Prairie, Fraser River, British Columbia.

This species of *Limnaea* approaches *L. elodes*, Say, but is more elongated, more fragile, and has the columella very strongly plicated.

The surface of the shell, when seen under a lens of moderate power, is finely decussately striated. It is of a horny color, and is of an elongated shape. (*Baird.*)

*Limnaea sumassi*, Baird, Proc. Zool. Soc. London, 1863, p. 68.

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

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

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

(PAGE 44)

*Limnaea haydeni*.—Shell ovate conic, smooth, thin, light horn-colored, imperforate; spire rather short; whirls five, convex; sutures deeply impressed; aperture ovate; Fig. 59. columella strongly plicate. Yellowstone and Big Sioux: Dr. Hayden. (*Lea.*)

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

Cat. No.;	No. of Sp.;	Locality.;	From whom received;	Remarks.
8250	18	Yellowstone River	.....	Original lot named by I. Lea.
8251	27	Ruby Valley.	Capt. J. H. Simpson, Army of Utah.	'Swamps'
8252	8	Mo. of the Yellowstone.	.....	'In alluvial.'
8255	4	Big Sioux.	.....	Named by I. Lea.
8253	9	30 m. w. of Ft. Kearney.	.....	.....