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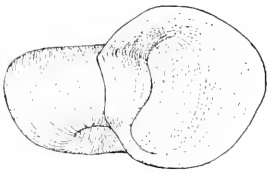

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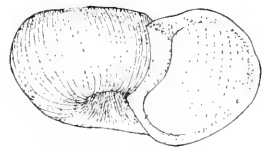

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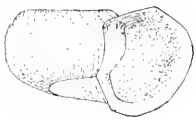

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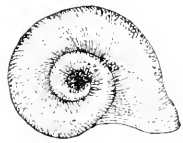

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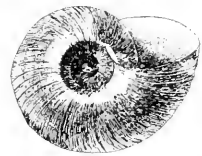

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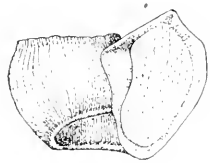

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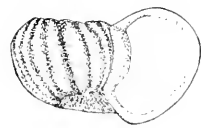

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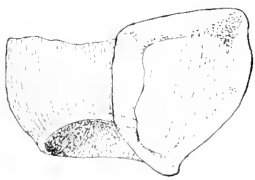

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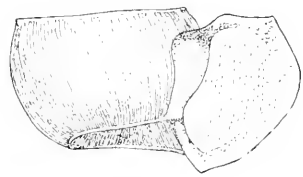

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PLANORBIS BICARINATUS AND ITS SUBSPECIES.

THE NAUTILUS.

VOL. XXIII. MAY, 1909. No. 1.

NOTES ON PLANORBIS II: P. BICARINATUS.

BY BRYANT WALKER.

PLANORBIS BICARINATUS Say. Pl. I, fig. 3.

1817. *Planorbis bicarinatus* Say, Nich. Encyc., pl. i, f. 4.

1822. *Helix angulata* Rackett, Lin. Tr. xiii, p. 42, pl. v, f. 1.

1834. *Planorbis engonatus* Conrad, N. F. W. Shells, sup. p. 8, pl. ix, f. 8.

1834.? *Planorbis antrosus* Conrad, Am. J. Sc. (1) xxv, p. 343.

1861.? *Planorbis lautus* H. Adams, Proc. Zool. Soc., Lond. 1861, p. 145.

This common and well-known species is one of the characteristic species of the fresh-water pulmonate fauna of eastern North America. It stands quite by itself, having, with the exception of the recently described *P. eucosmius* Bartsch from North Carolina, no closely related species in our fauna. It is the type of the subgenus *Helisoma* Swainson.

The shape of the shell is so well marked and distinctive that the synonymy is, as shown above, comparatively small. The *Helix angulata* of Rackett was, in all probability, described in entire ignorance of Say's previous description.

The type of Conrad's *P. engonatus* seems to have disappeared. According to Haldeman, who saw the "single original specimen," then in the collection of a Mr. Mason, it was a monstrosity. Conrad's figures are poor, but Haldeman's (Mon., pl. i, figs. 5 and 6), which are apparently excellent, confirm his opinion. It was found

at Albany, N. Y. Jay (Catalogue, 4th Ed., 1852, 10267) lists *P. bicarinatus* var. *engonatus* from Georgia. Through the courtesy of Mr. L. P. Gratacap, of the American Museum of Natural History, I have been able to examine these shells. Of the eight specimens in the set, one is a *P. campanulatus* Say, nearly but not quite mature; the remainder do not differ from the usual form of *bicarinatus*, except that the mature ones have a more or less expanded lip, and might well be referred to the form described by Haldeman as var. *angistomus*. None of them exhibit the peculiar flattening of the body whorl characteristic of *engonatus*. It seems probable that these specimens were referred to Conrad's species on account of the campanulate aperture.

What the *P. lautus* of H. Adams really is, is a matter of conjecture, which can be only definitely settled by reference to the type, if it is still in existence. In the meantime Tryon's supposition that it was a young specimen of his species seems probable enough to warrant its reference to *bicarinatus*, and thus eliminate it from the list of unknown American species.

Conrad's *P. antrosus* is no doubt a form of Say's species, and is quite probably the campanulate variety described by Haldeman as var. *angistomus*, under which it will be further discussed.

Say does not give the locality of the typical form in connection with his original description, but in describing the next species, *P. parrus*, mentions that both inhabited the Delaware, so that there is practically no doubt but that the types came from that river. The Delaware River form (pl. I, fig. 3) is the common manifestation of the species as it is usually found throughout the United States. Say's description, though brief, is excellent, and leaves little to be desired. An apparent typographical error occurs in the reprint from the 3d Ed. of Nicholson's Encyc., and probably in the original, as it is followed by Binney in his edition of Say's writings. The description as printed reads: "Shell subcarinate above, and beneath translucent." If the comma was placed after "beneath" instead of after "above," the sentence would be in better accord with the facts and in all probability with the intention of the author.

The name adopted by Say in his new species is almost a misnomer, as the typical form is really not carinated at all, either above or beneath. In both places it is rather a more or less acute angulation, and is never raised into a carina as, for instance, in *Valvata tricarinata* Say.

It is to be noted that Say, with his usual nice observation, describes the minute, revolving lines which are still characteristic of the Delaware River form, and which are not uncommon in specimens from other localities. In many instances, however, they are entirely lacking. Say described his species as sinistral. Without going into the question as to whether the shell is really sinistral or ultra-dextral, it may be said that with the exception of Say's original figures, and those of Call (Rep. Dept. Geol. Ind., 1899, p. 411, pl. viii, fig. 10), all the published illustrations known to the writer treat it as dextral, and in accordance with this practically universal custom the figures for the present paper have been drawn in that position. Those who prefer to consider the shell as sinistral have only to reverse the plate.

Considering the enormous extent of territory which it inhabits, and the diverse conditions of local environment to which it is subjected in different parts of its range, *P. bicarinatus* is, for a fresh-water pulmonate, remarkably uniform in its development, and comparatively few varietal forms have been described, and most of these have been distinguished within the last few years. Taking them in the order of their appearance, they are as follows:

I. Var. UNICARINATUS Hald., pl. I, figs. 6, 7 and 8.

Planorbis bicarinatus v. *unicarinatus* Haldeman, Monograph, p. 7 (1844).

"Whorls of the right (upper) side rounded; the carina on the left side revolves closely, so as to form a very narrow umbilicus, and the aperture is much extended towards the left." (Haldeman.)

Haldeman did not figure this form, but fortunately his type has been preserved in the collection of the Philadelphia Academy, and the figures here given have been drawn from it. It is very doubtful whether this form is entitled to varietal rank in the proper acceptation of the term. It will be observed from the figure that the inner whorls on the upper side are distinctly angulated, and that the angle does not wholly disappear until just before the aperture is reached. Such specimens are not uncommon in almost any large series, and all gradations from the bicarinate to the unicarinate form can be found in the same colony. It would seem, therefore, to be an individual rather than a racial characteristic. The form, however, is of interest as exhibiting the first step toward the purely ecarinate form described by Pilsbry as var. *aroostookensis*. The type came from the Schuylkill River.

II. Var. ANGISTOMUS Hald., pl. I, figs. 4 and 5.

Planorbis bicarinatus var. *angistoma* Haldeman, Mon., p. 7 (1844).

"Shell small, aperture campanulate, with the throat narrowed." (Haldeman.)

Haldeman did not figure this "variety," and his brief diagnosis copied above gives neither the dimensions of his type nor the locality from which it came. The type is not to be found in the collection of the Philadelphia Academy, and is apparently lost.

The claims of this form for varietal recognition are but little, if any, stronger than those of var. *unicarinatus*. In nearly all mature shells of *bicarinatus* there is a tendency, more or less developed, for the lip to become everted, and there is no difficulty in selecting a series showing all degrees of variation in this particular from the same locality. It is only occasionally that all the specimens in the colony are affected at the same time and to approximately the same degree. But sometimes this feature is very persistent; thus in the set from which the figure was selected not only are all the specimens (38) decidedly campanulate, but all previous lips were also campanulate, many of the specimens having two and some even three, the result being that the outline of the shell is in several instances greatly distorted. All the specimens from this locality were unusually flat, being very wide in proportion to their height. Similar specimens in all respects were collected in Bawbeese Lake, Hillsdale Co., Michigan, one of which, having a diameter of 16.5 mm., is only 4 mm. in height immediately in front of the aperture, the latter being 8 mm. in height. Some of these also are greatly distorted, showing apparently the effects of an unfavorable environment. Shells from Pine Island Lake, Kent Co., and Four Mile Lake, Chelsea, Mich., are somewhat similar, but the peculiar form is less strongly developed.

In many cases, no doubt, the sudden expansion of the lip is to be accounted for by unusually favorable food conditions at the time when the animal had really completed its normal growth; the consequent suddenly-acquired corpulency of the animal necessitating a special, rapid and expansive growth of the shell to accommodate its increased size. This seems to have been the case with the colony from which Figure 1 was taken. Up to maturity the shell was a typical *aroostookensis*, when suddenly the enormously expanded lip was developed. In this case, too, the whole colony was apparently

affected, at least the ten specimens which are now in my possession were all more or less, and that, too, without regard to size.

It seems quite probable that Conrad's *P. antrosus* from Randon's Creek, near Claiborne, Ala., is identical with this form. If so, and the form is worthy of varietal recognition, it would have priority over Haldeman's name.

Conrad never figured his species, and unfortunately gave no dimensions in his description. His specimens seem to have disappeared, and according to Tryon, in 1870, Conrad himself had forgotten all about it.

It is possible, however, that some of the original lot found their way to Europe, as the species was catalogued by Beck in 1837 as being in the collection of Prince Christian Frederick (Index Moll., p. 118, 1837). Whether these specimens are still in existence I do not know.

III. Var. CORRUGATUS Currier, pl. I, fig. 10.

Planorbis bicarinatus var. *corrugata* Currier, List of the Shell-bearing Mollusca of Michigan, p. 8, 1868.

This form was never described by Currier, who simply gives the locality as Perch Lake, Kent Co., Mich.

The figure is drawn from an authentic specimen (No. 3993, Coll. Walker), received from the late Dr. De Camp, who, in his Michigan Catalogue, described and figured several of Currier's species, but unfortunately neglected this one.

I have never seen but the single specimen from this locality, and do not know whether any more like it were found or not.

The form is peculiar in the strong, transverse plications, which extend entirely around the whorl, and are scarcely interrupted by the well-developed, superior and basal carinations; towards the aperture, however, they become less distinct. The revolving, incised lines are also deeply cut, and in this feature the form is similar to the var. *striatus* of Baker. It is altogether the most heavily sculptured form that I have seen. The specimen figured is rather small, measuring 9 mm. in diameter and 5 in height. The body whorl immediately in front of the aperture is 3 mm. in height. Individual specimens of var. *striatus* Baker from Long Lake, Grand Traverse Co.; Dead River, Ives' Lake, Mountain Lake, Little Lake and Howe Lake, Marquette Co.; Orchard Lake, Oakland Co., and Mud Lake, Montcalm Co., Michigan, and Gelot's Lake, New Sweden,

Me., exhibit a greater or less tendency to develop the transverse plications of this form, but none of them with anything like the strength or regularity of the specimen figured.

Similar specimens occur in the marl deposits at Bad Axe and other localities in Tuscola Co., Mich.

It is doubtful whether this form is entitled to rank as a variety. It is evidently an extreme development of the var. *striatus*, in which the transverse plication has been added to the revolving sculpture. If the name had not already appeared in the literature without description, and required explanation, I should hesitate to describe it as varietally distinct from *striatus*.

IV. Var. PERCARINATUS n. n., pl. I, fig. 12.

Planorbis bicarinatus major Walker, NAUT. VI, p. 136 (1893); *non* var. *major* of various species of various authors.

Shell very large for the species, thick and solid, dark horn-color tinged with purple; superior and basal carinæ elevated into a distinct keel, which is white; lip thickened, edged with brown, behind which externally is a broad, yellowish-white band, within banded by deep reddish-brown; lines of growth distinct, stronger and "puckered" around the carinæ; revolving lines very faint, not discernible except with a lens; aperture more or less expanded, sometimes distinctly campanulate, auriculate and distinctly modified by the extension of the carinæ to the lip.

The specimen figured measures 18.5 mm. in diameter and 10 mm. in height; height of body whorl in front of aperture 7.25 mm.; height of aperture 10.5 mm. A larger specimen, with a campanulate aperture, measures 19.75 mm. in diameter and 10.5 mm. in height.

Types (Nos. 3419 and 20074, Coll. Walker) from Crystal Lake, Benzie Co., Mich. Also from Pine Lake, Charlevoix Co., Mich. (Walker), and Rideau and Ottawa Rivers; Sparrow Lake, Simcoe Dist., Ontario, and Detroit Lake, Minn. (Pils.).

The original specimens, collected by the late Dr. M. L. Leach, were all dead shells, more or less bleached. The above description has been prepared from fresh specimens from the same locality collected by Dr. R. J. Kirkland, of Grand Rapids. Not in deference, for I think the rule an absurd one, but under the compulsion of the "International Code," I am forced to change the name of this very distinct variety and add another unnecessary synonym to the burden of systematic conchology.

V. Var. AROOSTOOKENSIS Pilsbry, pl. I, figs. 1 and 2.

Planorbis bicarinatus aroostookensis Pilsbry, NAUT. VIII, p. 115, 1875.

Shell having the spire and umbilicus very deep, the latter funnel-shaped, as in typical *bicarinatus*, but both upper and lower keels entirely obsolete or rounded off on the last whorl, which has the aspect of *P. trivolvis*. Surface minutely striated spirally, as in *P. bicarinatus*. Aperture less angular and less produced below than in *bicarinatus*, in consequence of the rounding of the whorls. Diameter 15 mm., alt. at aperture 7.5 mm. (Pilsbry).

Type locality, East Branch of Salmon Brook, Woodland, Aroostook Co., Maine (Pils.). Also Collins' Pond, Caribou River, Caribou, Aroostook Co., Me.; Charlevoix; Perch Lake, Kent Co.; Bessemer, Gogebec Co.; Fallams, Menominee Co., and Ispheming, Mich. (Walker).

Figure 2 represents the typical form of this variety, and is drawn from a topotype collected by Mr. O. O. Nylander. Figure 1 is the campanulate form, already referred to, which bears the same relation to typical *aroostookensis* that *angistomus* does to typical *bicarinatus*.

The Michigan specimens, especially those from the Upper Peninsula, are much smaller than the typical form, and in some examples there is a tendency to angulation on the whorls, but the large majority of the specimens are quite characteristic in the rounded, ecarinate form of the last whorl.

VI. Var. STRIATUS Baker.

Planorbis bicarinatus striatus Baker, NAUT. XV, p. 120 (1902); *Planorbis bicarinatus striatus* Baker, Trans. Acad. Sci., St. Louis, xvi, p. 9, pl. i, fig. 11 (1906).

In this form the microscopic, revolving sculpture commonly but not invariably present in the typical form is greatly intensified, and in the typical expression of the variety is quite conspicuous to the naked eye.

In the original description this sculpture is stated to consist of "raised spiral lines," while in the second paper quoted above it is said that "in some specimens the spiral lines are deeply incised." This incongruity is an apparent one only, and depends on whether the elevated or the depressed portions of the surface are wider or more conspicuous. Starting with the typical form, in which the revolving sculpture is either entirely wanting or very minute, it is

clear that the lines, when present, are incised. As the sculpture increases in strength, the intervals between the incised lines diminish, and when they become equal, the surface becomes typically striate and the revolving sculpture consists of incised or elevated lines, as the observer chooses to designate it.

Very rarely the surface is distinctly malleated, in which case there is a series of irregular, raised, revolving lines, which are quite different from the regular sculpture of var. *striatus*. The intensification of the spiral sculpture characteristic of this form seems to be peculiar to the northern states, as it has not been noticed from south of Mason and Dixon's Line. The most characteristic specimens come from the northern tier of states from Maine to Michigan.

The types were pleistocene fossils from Milwaukee, Wisconsin. It is a common form in Michigan, varying in size and proportion like typical *bicarinatus*. Specimens are also before me from the following localities: Square Lake; Rockville, Me.; Profile Lake, N. H.; Cedar Lake, N. Y.; Port Oram, N. J.; Gore's Bay, Manitolin, Id., Lake Huron, Algoma; Georgian Bay, Ontario.

VII. Var. PORTAGENSIS Baker, pl. I, fig. 9.

Planorbis bicarinatus portagensis Baker, NAUT. XXII, p. 45 (1908).

This recently described and very striking form is characterized by its closely coiled whorls, deeply funicular upper and lower surfaces and acute carination; the umbilicus is comparatively narrow and deeply excavated; the aperture is large, auriculate, higher than wide, and acutely angled above and before; the lip is sharp and but slightly expanded.

Type locality, Portage Lake, Aroostook Co., Maine. Also Square Lake, Cross Lake and Second Lake, Aroostook Co., Me. (Walker); Meaches Lake, Hull, Quebec (Pils.).

The figure is drawn from a cotype kindly furnished by Mr. F. C. Baker. Specimens from Carp Lake, Emmet Co., and Betsey Lake, Benzie Co., Michigan, though not typical, may fairly be referred to this form. Immature examples, especially those from Betsey Lake, are almost identical with the immature Maine specimens, the whorls, perhaps, being more regularly rounded and lacking the decided flattening towards the base of the typical form. But the mature shells, though retaining the sharp carination above and below, are more inflated, and the aperture is wider and does not extend so far above and below the body whorl as in the typical form, being in shape and

position more like that of var. *percarinatus* (fig. 12). Two additional specimens from the original locality, submitted by Mr. Nylander, agree very exactly with the Michigan form.

Mr. Nylander writes in regard to the habits of this form: "I think the variety *portagensis* lives in comparatively deep water, say 25 feet or so as only a few good specimens have been collected and these have always been "dead" shells. The specimens from Cross Lake were dredged in 25 feet of water.

This raises a question as to whether the inflated form of this variety is not correlated with its habitat in deep water as suggested by Pilsbry in regard to the *Physa* and *Planorbis* from Lake Patzcuaro, Mexico (Proc. P. A. N. S., 1891, p. 324).

A parallel case is found in *Lymnæa mighelsi* W. G. Binn, which in Michigan, at least, lives in deep water a large part of the year (See NAUT., XIV, p. 8). In fifteen years' collecting at Pine Lake, Marquette Co., Mich., I have found this species only twice in shallow water and then in considerable numbers, but only for a few days. It seems likely that the peculiar form of *Physa lordi* Bd. is to be accounted for in the same way as in Michigan; at least, it is found only in the larger inland lakes. *Planorbis multivolvis* Case is also apparently a deep-water species (NAUT., XXI, p. 61).

VIII. Var. ROYALENSIS n. v., pl. I, fig. 11.

Shell thin, light greenish horn-color; superior carination prominent, rounded, not acute; basal carina very strong, not acute, but forming a heavy, rounded cord around the deep, funicular umbilicus; upper surface concave, but more or less flattened and not as deep as the umbilicus; sides flattened and narrowed towards the base and contracted just above the basal carina; lines of growth strong and distinct, the sides being longitudinally coarsely and irregularly striated; revolving sculpture strong and distinct; aperture triangular, the upper side very nearly straight and almost flat, meeting the lip at nearly a right angle; acutely angled below; lip thin, sharp, not expanded. Alt. 10, diam. 15; height of body whorl in front of aperture 5 mm.

Types (No. 29163, Coll. Walker) from Siskowit Lake, Isle Royale, Lake Superior, Michigan. Cotypes in the collection of the Philadelphia Academy.

About twenty specimens of this strongly characterized form were

collected by the University of Michigan expedition in 1905, and are very uniform in the peculiar features above described. *P. bicarinatus* was collected in 1904 and 1905 in a number of different localities in various parts of the island, but all such were quite typical in form.

The longitudinal sculpture of this form is unusually strong for the species, and reminds one of the heavy sculpture of *P. corpulentus* Say, but differs in being less regular and lacking the acute ridges of that species. *Royalensis* is nearer to *portagensis* than to any other form of *bicarinatus*, but differs in being wider and in the development and position of the superior carina, wider umbilicus, stronger basal carina and shape of the aperture.

(*To be continued.*)

RECENT FRESH-WATER FOSSILS FROM BRONX BOROUGH, NEW YORK CITY.

BY EDWIN W. HUMPHREYS.

The shells here mentioned were found at what is now 171 St. and Morris Ave., Borough of the Bronx, New York City. The swamp which is situated at this point lies in a long, narrow, anticlinal valley which has been eroded in the Inwood Limestone. When the street, now known as Morris Ave., was filled in across the swamp, the peaty deposit, which had accumulated here, was forced up to heights of several feet on either side of it. This caused the peat to crack in all directions and revealed numerous pockets which were full of small shells. The shells were extremely abundant; so thickly were they heaped together that they could easily be scooped up with a garden trowel. From the manner in which they were found it would seem as if they had been gathered together by currents or eddies in the waters of the swamp. All of the shells were bleached to a chalky whiteness and were very fragile. The following species were found.

Amnicola limosa (Say) Hald. Shells of this species, though common, were not very abundant and were usually more or less injured.

Valvata tricarinata Say. These were exceedingly numerous, hundreds of them being heaped together in a single pocket. They were of all sizes, some being so small that they were lodged in the apertures of the larger ones. Evidently they represented individuals of all ages.

Physa heterostropha Say. This species was rather scarce.

Planorbis bicarinatus Say. This form was also uncommon.

Planorbis parvus Say. These varied in size as much as did the shells of Valvata tricarinata Say, and were about as abundant.

Pisidium variable Prime. This species was very rare. Usually the valves were separated, only occasionally were they found united.

Whether or not these forms still inhabit this place I am not prepared to say. Though I have not been able to find any living individuals, further search may yet reveal them.

I desire to acknowledge the assistance of Mr. L. P. Gratacap and Mr. Bryant Walker in the identification of some of the species.

UNIONIDAE FROM AN INDIAN GARBAGE HEAP.

BY DR. A. E. ORTMANN, CARNEGIE MUSEUM, PITTSBURGH, PA.

On the western banks of the Monongahela River in southwestern Pennsylvania, upon the flood plain at the Point Marion Ferry, in Greene Co., opposite the point where the Monongahela and Cheat rivers unite, the writer found on July 9, 1908, a heap of *Unionidæ* shells, buried about one to two feet in the soil on the side of a road. The soil consists of the characteristic river-silt of this region. Since Indian "relics" have frequently been found at this place, in fact, since it is known as the site of an old Indian settlement, it seems beyond question that this pile (about 2 feet high) represents an old Indian garbage heap of shells which had been used for food.

When first found, the shells were rather brittle and soft, and many of them crumbled to pieces. But enough were secured, which remained whole, and subsequently they have hardened. They look like fossil shells in so far as in most of them the epidermis, and with it the color, is gone (only in a few *Quadrulas* fragments of the epidermis remain). In species, where the nacre originally is colored (*Unio gibbosus* and *crassidens*), the color has entirely faded away, or only very slight traces of it are discernible.

It is hard to say how long ago this pile was formed: it may be less than a hundred years old. But this does not matter. The interesting fact about it is that this shell heap has furnished a small collection of *Unionidæ*, which contributes considerably to our knowledge of the *Unionidæ*-fauna of the Monongahela River drainage.

At the present time, on account of the pollution of the water, this fauna has completely disappeared in the Monongahela proper: there

is not a single living mussel in this river from Pittsburgh to the West Virginia state line (which is within a mile and a half to the south of our locality). Only a few of the tributaries contain mussels, and the most important one is the Cheat River, in which (in Pennsylvania), a rich fauna is yet present within two miles of our locality. The writer has collected repeatedly in the Cheat, in Fayette Co., from a point about a mile above Point Marion up to Cheat Haven, close to the State line. Another locality for *Unionidæ* is about three miles to the north, in Dunkard Creek, Greene Co., where the writer also collected a number of species. It is interesting to compare these faunas with that of the Indian garbage heap at Point Marion Ferry, which either comes from the Monongahela proper, or from the Cheat.

I give first here a list of the latter.

1. *Truncilla perplexa cincinnatiensis* (Lea). 3 double, 11 isolated valves, all males of medium and small size. This is not the typical *cincinnatiensis*, but a form intermediate between this and the typical *perplexa* (Lea); the nodes upon the disc are rather small and more numerous than in the typical *perplexa*, but they are less numerous than in *cincinnatiensis*.

Tuberculate forms of *Truncilla perplexa* have never been found recently in western Pennsylvania; all specimens of *perplexa* of this region belong to the next variety.

2. *Truncilla perplexa rangiana* (Lea). 6 double, 7 isolated valves, all males of medium and small size.

Not found at present in the Monongahela drainage, but rather abundant in the Allegheny River from Armstrong County upward. Also in the Shenango River in Lawrence County; the nearest localities at present are about 80 to 100 miles away from Point Marion.

3. *Lampsilis ventricosa* (Bar.). Fragment of one left valve; young specimen.

At present near Point Marion, both in the Cheat River and Dunkard Creek. Widely distributed in western Pennsylvania.

4. *Lampsilis ventricosa ovata* (Say). Fragment of one left valve (beak portion); young specimen.

Not found at present in the Monongahela drainage. It used to be in the Ohio in Allegheny County, and is yet found in the Ohio in Beaver County and in the Allegheny in Armstrong County and farther up.

5. *Lampsilis multiradiata* (Lea). 2 double, 1 single valve; me-

dium size. Although the characteristic color of the epidermis is gone, these specimens agree completely with this species in the shape of the shell and of the hinge teeth.

This species is found in the Cheat River and elsewhere in western Pennsylvania, preferring smaller streams.

6. *Lampsilis ligamentina* (Lam.). 4 isolated valves; one young, the others of medium size.

At present in the Cheat River, but not abundant. It is the most abundant species in the large rivers of western Pennsylvania.

7. *Obovaria circulus* (Lea). 1 left valve; small. Not typical, inclining toward *O. lens* (Lea) in shape; probably a female.

This species (including the form *lens*) is found scattered over the Ohio drainage in western Pennsylvania. From the Monongahela it is known only from a single locality at Charleroi, Washington County, about 35 miles north of Point Marion

8. *Cyprogenia irrorata* (Lea). 2 double, 4 isolated valves, of medium size.

Not in the Monongahela drainage, and altogether rare in western Pennsylvania; known from the Ohio below Pittsburg and from the Allegheny River in Allegheny and southern Armstrong County. No live specimens have been found recently.

9. *Ptychobranchus phaseolus* (Hildr.). 1 double, 3 isolated valves, of medium size.

Abundant in Cheat River; also in Dunkard Creek. Widely distributed in the Ohio drainage in western Pennsylvania, with exception of the large rivers.

10. *Unio gibbosus* Barn. 4 double, 7 single valves, medium and small size.

Abundant in Cheat River; also in Dunkard Creek. Everywhere in western Pennsylvania.

11. *Unio crassidens* Lam. 7 double, 4 single valves; one above medium size, the others medium and small.

Only in the large rivers; abundant in the Ohio and lower Allegheny. Known from the Monongahela at Charleroi, Washington County, but not farther up. No trace of it in the Cheat.

12. *Pleurobema clava* (Lam.). 2 single valves, medium size.

Present in Cheat River. A rare species in western Pennsylvania, preferring smaller streams.

13. *Quadrula subrotunda* (Lea). 1 double, 5 single valves; medium and small size.

In the Cheat River at present. Also in the Monongahela at Charleroi, Washington County, and in the Ohio and Allegheny Rivers from Beaver to Armstrong Counties. A species of the larger rivers.

We see, that of these thirteen forms one (*Truncilla perplexa cincinnatiensis*) is not present any more in western Pennsylvania, and five (*Truncilla perplexa rangiana, Lampsilis ventricosa ovata, Obovaria circulus, Cyprogenia irrorata, Unio crassidens*) are not found any more in the vicinity of Point Marion (in Cheat River or Dunkard Creek). Of the latter, *Lampsilis ventricosa ovata, Cyprogenia irrorata*, and *Unio crassidens*, are typical inhabitants of the large rivers, and, near Point Marion, possibly once existed only in the Monongahela River, the fauna of which is now destroyed. *Truncilla perplexa* and *Obovaria circulus* may yet turn up in the Cheat River, but, if present at all, must be very rare at the present time. This is the more remarkable, since the two forms of *Truncilla perplexa* were represented, in the garbage heap, by a comparatively great number of individuals.

The small size of all specimens shows that the Indians selected for food only such small specimens, rejecting the big ones.

The chief interest of this little collection lies in the fact that it gives us an idea of what damage has been done to our *Unionidæ-fauna* in recent times. For comparison, I submit here the lists of the species collected by myself in Cheat River and Dunkard Creek.

Cheat River (collections made on Sept. 6, 1904, Sept. 16, 1907, July 10, 1908).

1. *Lampsilis ventricosa* (Bar.).
2. *Lampsilis multiradiata* (Lea).
3. *Lampsilis ligamentina* (Lam.).
4. *Lampsilis recta* (Lam.).
5. *Lampsilis iris* (Lea).
6. *Ptychobranchus phaseolus* (Hildr.).
7. *Strophitus undulatus* (Say).
8. *Symphynota costata* (Raf.).
9. *Alasmidonta marginata* (Say).
10. *Unio gibbosus* (Barn.).
11. *Pleurobema clava* (Lam.).
12. *Quadrula undulata* (Barn.).
13. *Quadrula pustulosa* (Lea).
14. *Quadrula subrotunda* (Lea).
15. *Quadrula tuberculata* (Raf.).

The leading species is *Unio gibbosus* (30 per cent.); then follow: *Lampsilis recta* (20 per cent.) and *Ptychobranchus phaseolus* (20 per cent.). The rest (12 species) makes up the remaining 30 per cent. The scarcity of *Lampsilis ligamentina* is remarkable, since this species usually is the leading species in our rivers. Probably, this locality

is near the limit of the range of this species, and the latter does not go much farther up stream. All of the species are rather small, which is most striking in *Lampsilis recta*, which actually is represented by a dwarf race.

All the species have been found alive, except *Quadrula undulata*.

DUNKARD CREEK (collections made on July 8 and 9, 1908).

1. *Lampsilis ventricosa* (Barn.).
2. *Lampsilis luteola* (Lam.).
3. *Lampsilis recta* (Lam.).
4. *Lampsilis iris* (Lea).
5. *Proptera alata* (Say).
6. *Tritogonia tuberculata* (Barn.).
7. *Ptychobranchus phaseolus* (Hildr.).
8. *Strophitus undulatus* (Say).
9. *Anodonta grandis* (Say).
10. *Symphynota costata* (Raf.).
11. *Unio gibbosus* (Barn.).
12. *Quadrula rubiginosa* (Lea).
13. *Quadrula tuberculata* (Raf.).

Of these, only *Lampsilis luteola* and *Anodonta grandis* were found alive: the condition of the creek was not favorable for collecting (first and second day after a heavy thundershower). It is probable, that the fauna is not complete, and I cannot say anything about the frequency of the single species.

VARIATION.

BY REV. HENRY W. WINKLEY.

First, nature never makes two individuals exactly alike; secondly environment. One hundred shells of the same species from a given locality will show individuality. Compared with a group of the same species from another region there is another difference. Like the difference between races of the human family, this is undoubtedly due to environment. At Eastport, Maine, where the Bay of Fundy tides create strong currents, chitons, limpets and other forms are in profusion and attain unusually large size. These may be called sedentary forms and depend on food being brought to them. A few feet away Buccinum is abundant but small. The same is true of *Lunatia heros* found in neighboring waters. These are carnivorous forms and are much larger at Casco Bay and its neighborhood.

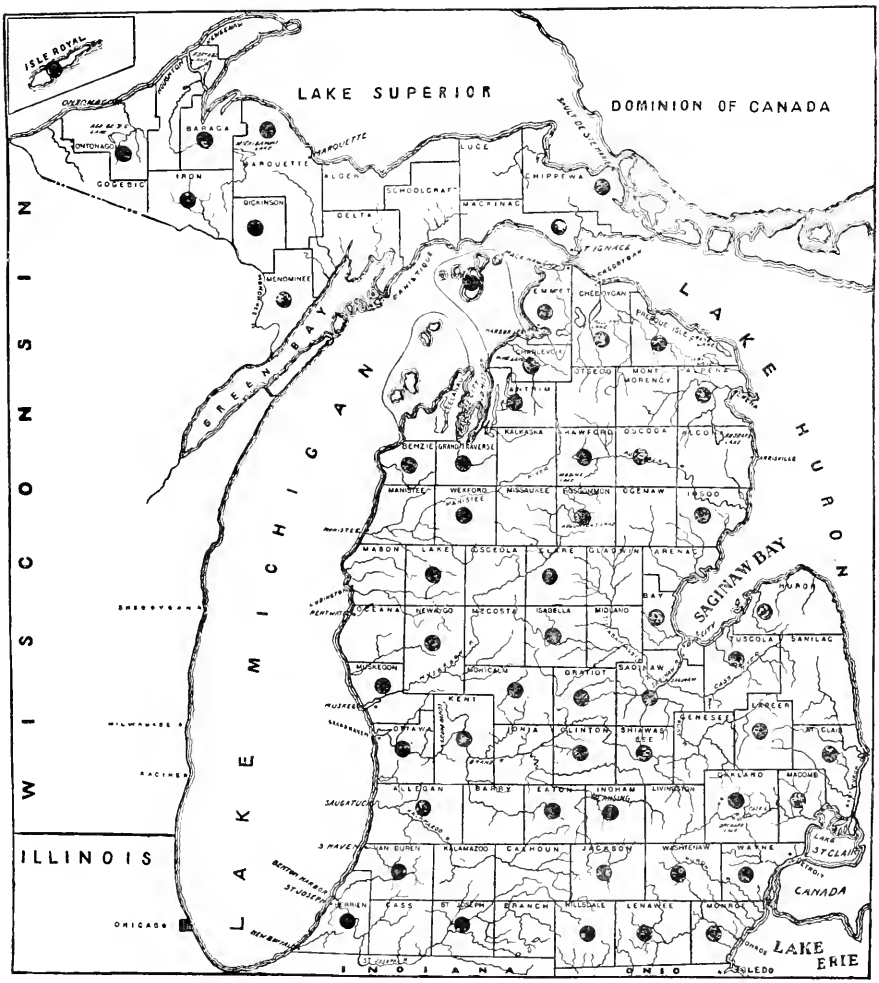
Haminea solitaria is a white shell. A small colony from the

Branford River has every individual a deep brown. I wonder if this is due to the presence of a large iron foundry a short distanee away. Erosion is not a characteristic, yet it does result from environment. This is conspicuous where unios are taken from waters where there is decaying vegetation. The reason is well known; acid from decaying leaves acts on the lime of the shell. The same effect may be seen in marine shells taken from waters where a river meets the sea. An interesting effect of air may be seen in the author's cabinet. Shells of *Fusus decemcostatus* taken below low tide are well preserved even to the apex; others from a few yards away, exposed to the air at low tide, are much eroded.

Pure white sets of *Gemma gemma* may be found at Woods Hole and Branford, Conn. At Provincetown they are a very dark purple, some specimens showing hardly a trace of white. At Revere Beach the type is white with perhaps a third of the shell faintly tinted purple. Reasons for this variation I cannot give. Nor can I explain why sets found a dozen years ago at Revere Beach should vary from specimens obtained at the same spot a year ago.

Litorinella minuta is abundant in pot holes in the marshes. Environment there is good for it. A dwarfed variety is found in the Branford River, and the same form occurs on dead eel grass under the wharves at Provincetown. Evidently this form flourishes better in still water. Temperature has its influence. *Planorbis trivolvis* occurs throughout New England. It is small in the Connecticut River at Springfield, the same at Branford and eastern Massachusetts. In northern Maine large, and the largest and finest set in the author's cabinet was obtained at Dalton, Mass., in the Berkshire hills. This last region is well known as having northern insects, undoubtedly the other species of shells would show affinity with the forms in northern New England. Climate alone explains this variation. The forms from the Connecticut River certainly have water enough, but they are small. Other sets are from small bodies of water; only in colder regions does this giant thrive.

Environment drives out some species and retains others. These few examples are variations in the same species which shows the effects of different surroundings.



DISTRIBUTION OF PLANORBIS BICARINATUS IN MICHIGAN.

THE NAUTILUS.

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SOME OBSERVATIONS AND NOTES ON MUSCULIUM.

BY V. STERKI.

Most or all of our species of *Musculium* Link (*Calyculina* Clessin) are very variable. *E. g.*, of *M. securis* Pr. there are almost endless forms, some of them so different from others that they appear to be distinct species, even of different groups. They readily respond to the nature of their habitats, and almost every place has its own peculiar forms. It may be added that most of them are inhabitants of quiet waters: small lakes, ponds, pools, marshes, ditches, slow streams; but *M. transversum* Say is also found in rivers with strong current, with stony and rocky bottoms.

Years ago Clessin stated his belief that they are comparatively short-lived and of cyclical development, annuals. The first part of his statement is probably correct, the latter probably not, or not for all species; specimens at all stages of growth, from newly hatched to full-grown, can be found at any time of the year. Yet under certain conditions their development appears to be uniform; *e. g.*, where pools dry up in fall, only the young mussels appear to survive, to grow to maturity and propagate during spring and summer.

These mussels are described as having their beaks calyculate, or "capped," and the genus has been established mainly on that feature.[1] But in most and probably in all species, specimens and forms are found with slightly or non-calyculate beaks, and such are the rule

[1] Yet even without that supposed but mistaken character the genus appears to be well founded, as will be shown elsewhere.

rather than the exception in *M. transversum* Say. By the way, it may be said that calyculate beaks are found occasionally in specimens of *Pisidium* and *Sphærium*.

The nepionic (embryonic) mussel when discharged from the parent is generally well inflated (except in *M. transversum*), and then the postembryonal part of each valve is marked off from it by a constriction more or less deep. This seems to be especially well marked when the embryos have been retained by the parent for a long time, *e. g.*, over winter, and are overgrown, as it were.[1] Under favorable conditions the embryos are probably discharged as soon as sufficiently developed, moderately inflated, and then postembryonal growth goes on in the same direction without or with a slight demarcation line.

There are in my collection a number of lots of a *Musculium*, different from all other species described and known, from Rhode Island, Virginia, Ohio, Michigan, and remarkably alike. The mussels are somewhat like medium-sized *M. securis* Pr., but more elongate, moderately and evenly inflated; the anterior and posterior parts are less disproportionate, the latter is less high, less and more obliquely truncate, the beaks are not calyculate, rounded, comparatively broad and not very prominent; even under the microscope, no demarcation line between the embryonal and postembryonal parts can be seen; the surface is markedly regular, without or with slight lines of growth, with very fine striæ and a slight silky gloss; the color is dark horn, not yellowish, somewhat lighter along the margins, but there are no sharply defined zones, as common in *securis*. Isolated, this *Musculium* would appear to represent a distinct species; but younger specimens, evidently of the same form, have more the outlines of *M. securis*, and in every lot there are some specimens of the same, with the beaks calyculate, and generally there are intermediate ones, as to outlines and general appearance. Several of the lots were collected in fall, from September to November, and others probably so. It appears probable that this is a summer form of *M. securis*, of fast and steady growth under favorable conditions, consequently not a variety. Corresponding forms of other species have also been seen. If verified by future observations, this is a remarkable and very interesting fact.

Also the varieties and local forms of all species, and the conditions

[1] Under the microscope such specimens show several concentric zones along the margins of the valves, marked by lines of growth.

under which they grow, should be carefully studied. In order to do this much more good material is needed from all over the continent. It is very desirable to collect repeatedly, throughout the year, at favorable places, wherever there is an opportunity for doing so; it is essential to have the date of collecting with every lot, notes on the nature of the habitat, and last but not least, to have good numbers of specimens, not only the large ones, but also the half-grown and young. Any material, from anywhere, will mean a contribution to our knowledge.

It may be added that the simplest and best means for collecting small fresh-water mollusca, Sphæriidæ and gastropods, is a sack net of good burlap on a frame of strong wire ($\frac{1}{5}$–$\frac{1}{4}$ inch), the ring of about 6–8 inches diam., tied to a handle of suitable length, *e. g.*, a broomstick. In this net mud and other material, scooped up from the surface of the bottom, is washed, the coarser things gradually removed; the remainder is taken home and dried well, but not in too great heat. Then, a small sieve, *e. g.*, a strainer, or several of different mesh measures, are very serviceable for separating finer and coarser material, and it will be much easier to pick out the specimens, of which the smallest should not be overlooked; some *Pisidium* are not larger than 1 to 2 mm. when mature. Specimens to be sent for examination are best left mixed up, or separated only for considerable differences of size. The washings and specimens must be handled carefully, especially *Musculium*, since most of them are very fragile. The whole "stuff," dirt and all, fresh or dried, may be sent for examination, after the coarser materials are removed.

For deep water a drag-net or small dredge of burlap will do good service, especially if protected by an outer sack of strong canvas with the bottom left open. It is very desirable that collecting be done in lakes and deep rivers.

DESCRIPTION OF A NEW FOSSIL LYMNÆA.

BY F. C. BAKER.

LYMNÆA NASHOTAHENSIS n. sp.

Shell elongated, somewhat pyramidal; surface dull, growth-lines conspicuous, crossed by fine, impressed spiral lines; whorls 6–6½, rather rapidly increasing in diameter, flatly rounded, the body whorl very large and quite convex or even gibbous; spire broadly pyramidal or conic, longer than the aperture; sutures well marked; aperture

long, ovate, much narrowed above, generally wide and flaring below; outer lip with variceal thickening; inner lip rather broad, reflected over the umbilical region, forming a conspicuous expansion and leaving a well-marked umbilical chink; parietal callus wide and rather thick, in some specimens rendering the aperture continuous; axis twisted; the columella is plicate in the immature shell, but in adult or old specimens the inner lip is raised over the umbilicus, somewhat as in *emarginata*.

Length 33.50, breadth 13.00; aperture length 14.00, breadth 7.00 mm.

Length 29.00, breadth 13.00; aperture length 15.00, breadth 6.75 mm.

Length 28.75, breadth 13.50; aperture length 15.75, breadth 7.00 mm.

Length 25.00, breadth 12.00; aperture length 14.00, breadth 7.25 mm.

Length 21.00, breadth 10.00; aperture length 12.00, breadth 6.00 mm.

Length 24.00, breadth 10.00; aperture length 11.00, breadth 5.00 mm.

Length 18.25, breadth 8.25; aperture length 10.00, breadth 4.25 mm.

Types: The Chicago Academy of Sciences, 9 specimens, No. 24539; cotypes, Academy of Natural Sciences, Philadelphia, No. 98521, 6 specimens.

Type locality: Marl beds, Nashotah, Waukeshaw County, Wisconsin.

Remarks: *L. nashotahensis* was at first thought to be a form of *Lymnæa danielsi*; it differs markedly from that species, however, in several particulars—the spire is broader and not so acute, the body whorl is larger and inclined to be gibbous, there is a conspicuous umbilical chink (*danielsi* is usually imperforate), and the columella is not noticeably plicate. In *nashotahensis* the aperture is elongate ovate, narrowed above and broadened below, where it is often patulous. The upper whorls are strongly suggestive of *Lymnæa reflexa*, the penultimate whorl having the swollen appearance so characteristic of *reflexa*.

Young specimens somewhat resemble *Lymnæa catascopium*, differing in being narrower, with a more elongate aperture, longer and less

rounded whorls and a less distinctly plicate columella. There is also an umbilical chink, which is usually absent in *catascopium*.

Like Walker's *Lymnæa bakeri* from Michigan, *nashotahensis* is apparently an extinct species peculiar to marl deposits. The specimens were secured by Mr. F. M. Woodruff.

NOTES ON PLANORBIS II: P. BICARINATUS.

BY BRYANT WALKER.

(Concluded from May Number.)

IX. Miscellaneous.

In Beck's Index Moll. (1837), p. 118, the following synonymy of this species is given:

"*Planorbis bicarinatus* Say. Am. Septr. C. C.

a. major. S. g. iv, 4. W. S. vii, 12. Fl. Schuylkill.

Pl. angulatus Wood.

b. minor.

an *P. eburneus* Ch. ix, 1123? New Jersey."

P. angulatus Wood, Index Testaceologicus, edit. II, 1828, Suppl., pl. 7, f. 12, is a typical *P. bicarinatus*. The figures in Sowerby's Genera, referred to by Beck (as "S. g.") are the same species.

Beck defined his *minor* only by a queried reference to Chemnitz's figures of a West Indian species, really entirely different.

Distribution.

The recorded distribution of *Planorbis bicarinatus* is shown with approximate exactness upon the accompanying map (pl. III). These data are primarily based upon the collection of the Philadelphia Academy, the complete list of which has been kindly furnished by Dr. Pilsbry. To these have been added such additional information as was afforded by my own collection. The localities thus vouched for are indicated on the map by the black dots. These data have been supplemented by such specific localities as a careful search of the literature at my command afforded. These citations are represented by the outlined dots. Duplicate citations and those giving simply the "State" have been omitted. A detailed list of all localities and the authorities for the same is given below. The map does

not extend far enough north to allow the localities in Keewatin, Canada, to be plotted.

While the exhibit as a whole affords what is probably a fairly accurate view of the actual distribution, yet it also shows how lamentably small our knowledge really is of the range of one of our most common species, and how much still remains to be done before any generalization can be other than tentative. Still the chart is of interest as showing what we do know, and serves to indicate the regions to which attention of American collectors should be particularly directed. Thus the apparent absence of the species from the entire littoral Atlantic region (with the exception of a single record from Wilmington, N. C.) from the Potomac to Florida, and along the coastal region of the Gulf from Florida to Texas is very striking and worthy of investigation. So, too, the exact range towards the west is important and of considerable scientific interest. No doubt many of the deficiencies of the present map can be supplied from material already accumulated in the many private collections of the country, and it is hoped that this review of the subject will induce the publication of all such information for the benefit of those interested in the geographical distribution of the American fauna. For it is only by the accumulation of detailed information, such as is afforded by the publication of carefully authenticated local lists, accompanied by exact localities, that any substantial advance can be expected.

Taking the chart, such as it is, certain facts can be deduced with a great degree of certainty, while others must still remain more or less tinged with uncertainty until more exact knowledge shall either prove or disprove them. On the north it seems reasonably certain that *bicarinatus* extends through British America from Anticosti, New Brunswick and Nova Scotia west to at least Lake Winnipeg and Manitoba and north to Keewatin. In all probability it may be found to range west through Saskatchewan and Assiniboia well toward the Rocky Mountains.

The data already accumulated shows a distribution through the northern United States from Maine to Oregon. The northwestern data, though scant, tend to show that the invasion of the valley of the Columbia was through transfer from the headwaters of the Missouri or its tributaries to the Snake, Pend Oreille or other tributaries of the Columbia.

The accuracy of that veteran collector, Henry Hemphill, as to its occurrence at Antioch, California, quoted by Stearns (1881), is not to be questioned. But the fact that there is no other record of its occurrence in California certainly tends to show that the Antioch find was a sporadic colony, accidentally introduced, and which never succeeded in effecting a permanent foothold.

The citation of this species from the Yaqui River, Guaymas, Mexico, on the Gulf of California, by Stearns (1889), where it is said to have been collected by Palmer, is open to more doubt. It appears that *Polygyra hirsuta* was also alleged to have been collected at the same time and place. The nearest authentic locality for this species is southwestern Missouri. There is no evidence that *bicarinatus* has ever been discovered anywhere in the Colorado basin. The occurrence of two common eastern species at the same time in a locality so remote from the known range of either is certainly very remarkable, and would naturally raise a question as to whether there had not been an accidental mixing of specimens. *Bicarinatus* is not quoted from Mexico at all by Crosse and Fischer, and its occurrence at Guaymas is very improbable.

Leaving these two doubtful citations out of the question, the only authentic occurrence of *bicarinatus* on the Pacific coast is along the Columbia in Oregon; south of that the Rocky Mountains, no doubt, mark the western range of the species.

In the Potomac River at and below Washington, D. C., *bicarinatus* is an abundant species. South of that, with the exception of Wilmington, N. C., so far as the records show, it is absent from the entire coastal Atlantic region. In western North Carolina and northwestern Georgia it is found in streams belonging to the western drainage. We have no records from South Carolina and Florida. The large amount of collecting that has been done in various parts of the latter state goes to show that it does not occur there. South Carolina is practically unknown conchologically. It was not found by Henderson at Yemasee, Beaufort Co. (NAUT. XXI, p. 7). Mr. Wm. G. Mazyck, of Charleston, S. C., informs me that he has never known of its occurrence in that state, and that it is not quoted in either of Ravenel's Catalogues of 1834 or 1874. In Alabama, though not abundant, it occurs in the northern part of the state, and extends in the Alabama drainage as far south at least as Pinehill, Wilcox Co. There are no records for either Mississippi or Louisiana.

In Texas it is an abundant species, at times, in the central eastern part of the state, and no doubt ranges north from there. But there are no records from the valley of the Rio Grande and, as stated before, none from Mexico. This river would therefore seem beyond the southwestern range of the species.

So far as the records show, it is apparently absent from the entire coastal region on the Gulf.

Since the above was written and the map (Plate III) was prepared, Mr. H. H. Smith has collected typical *bicarinatus* in Beaver Creek, Conecuh Co., Ala. This "find" not only carries the species further south than previously recorded, but brings it into the western extension of the Atlantic fauna area along the Gulf Coast. Beaver Creek is a tributary of Murder Creek, which forms part of the Escambia River drainage system.

West of the Appalachian Mountains, *bicarinatus* is, in suitable localities, a common species in all the states as far west as Kansas and Colorado, and there is no great doubt but that it ranges, in suitable environment, west to the mountains. But the data at hand are too few and too scattering to give any exact information as to the limits of the western range. They are indicated on the map and given in detail in the following list:

Distributional Data.

United States.

Alabama: Big Willis Creek, Atalla; Coosa River, Minnesota Bend; Black Warrior River, Jefferson Co.; Cub Creek, Pinehill; Princeton (Walker); Beech Creek, Selma; Cahawba River (Lewis); Coosa River, Farmer (Hinkley).

Arizona: None.

Colorado: Boulder (Pils.); Lodge Pole Creek, Logan Co.; Owens Lake, Boulder; Weld Co.; Greely (Henderson).

Connecticut: West Granby, Hartford Co. (Pils.).

Arkansas: White River, Carroll; Big Creek, Sebastian; Ouachita River, Hot Spring (Sampson).

Delaware: Brandywine River, between Dupont's and Rockland (Pils.).

District of Columbia: Washington (Pils.).

Florida: None.

Georgia: East Rome (Pils.); Silver Creek, East Rome; Armuchee Creek, Rome; Dalton (Walker).

Idaho: Old Mission (Pils.); Blue Creek, Cœur d'Alene Mountains; Cedar Creek, Priest Lake (Walker).

Illinois: Athens; Rock Island (Pils.); Joliet (Ferriss MSS.); Cook Co.; LaSalle Co.; Des Plaines River; Kappa, Panala, Woodford Co.; Crystal and Silver Lakes and Algonquin, McHenry Co.; Mercer Co.; Elgin, Kane Co.; Illinois River and Dogfish, Quiver and Matanzas Lakes, Havana, Mason Co.; Fourth, Sand, Cedar, Fox, Pistakee, Clear, Long and Slough Lakes, Lake Co.; Pope Co.; Johnson Co.; Thompson's Lake, Fulton Co.; Milan, Rock Island Co.; Pekin, Tazewell Co. (Baker).

Indian Territory: Tushkahama (Ferriss, MSS.).

Indiana: Randolph Co. (Pils.); Cedar Lake; Bass Lake, Stark Co. (Baker); Connorsville, Danville (Walker); Richmond, Wayne Co. (Plummer); Indianapolis, Whitewater Basin, West Whitewater Basin, Maumee Basin, St. Joseph Basin, Lake Michigan Basin (Call), Franklin Co. (Moore and Butler); Lake Michigan, Michigan City; Lake James, Steuben Co.; Clear Lake, LaPorte Co. (Daniels).

Iowa: Iowa City; DeWitt; Clear Lake; Davenport (Pils.), Muscatine, Des Moines, Ruthven (Walker); Spirit Lake (Keyes).

Kansas: Walnut Creek (Pils.); Topeka; Ellis; Soldier Creek, Silver Lake Twp., Shawnee Co.; Northern Wabaunsee Co.; Brown Co.; Cedar Creek, Mt. Ida; Barber Co.; McDowell Creek, Riley Co.; Kansas River, Wyandotte; Neosho Co. (Call).

Kentucky: Bowling Green (Pils.).

Louisiana: None.

Maine: Caribou, Aroostook Co.; Rockland, Knox Co. (Pils.); Orono, Fort Kent, St. John's River; Gelot's Lake, New Sweden; Second Lake, Fish River; Salmon Brook, Aroostook River; Woodland, Collins' Mill Pond, Portage Lake, Square Lake, Aroostook Co.; E Warren; Rockville (Walker); Cross Lake Inlet; Cross Lake; Moose River, Somerset Co. (Nylander); Moosehead Lake (Johnson); Portland (Pickering).

Maryland: Cumberland; Hancock; Chestertown, Kent Co.; Flintstone, Allegheny Co.; Conecocheque River at National Road (Pils.); Potomac River, Fort Washington (Walker).

Massachusetts: Pontoosuc Lake, W. Mass. (Pils.); Cambridge; Amherst (Walker); Fresh Pond (Adams); Swampscot, Lynn and vicinity (Tufts); Stockbridge (Ferriss, MSS.); Bristol Co. (Taylor and Shiverick).

Michigan: The writer has records from 52 of the 83 counties of the state, indicating a general distribution throughout the state. The counties represented are shown by the map (plate II).

Minnesota: Lake Albert Lea; Fergus Falls (Pils.); Stearns Co.; Lake Minnetonka; Cannon Lake, Rice Co.; Shackleton Lake (Walker); Minneapolis; Lake Minnewaska, Pope Co.; Vermilion Lake, Winona, Lake Co.; St. Louis Co. (Grant); Clearwater, Wright Co. (Sargent); Harriet Lake, Hennipen Co. (Daniels); Heron Lake, Jackson Co.; Eagle Lake, Sherburne Co. (Stearns).

Mississippi: None.

Missouri: Pettis Co.; Lamar, Barton Co. (Sampson).

Montana: Mingusville, now Wibaux (Squyer).

Nebraska: Sidney (Walker); streams of eastern Neb. (Aughey); Omaha (Tryon).

Nevada: None.

New Hampshire: Profile Lake (Walker); Keene (Walker and Coolidge).

New Jersey: Greenwood Lake, Passaic Co.; Raritan River; Cedar Lake, White Pond, Warren Co.; Swartzwood Lake, Sussex Co.; Center Twp., Camden Co.; Delaware Water Gap; Princeton, Mercer Co.; Lake Hopateong, Budd's Lake, Morris Co.; Hackensack Valley; Closter, Bergen Co.; Trenton; Gloucester Co. (Pils.).

New Mexico: Las Vegas; South Spring River, Roseville; Trementina; Santa Fe; Arroyo Pecos, Las Vegas (Pils.).

New York: Cazenovia; Skaneatales Lake; Long Island; Niagara; Hudson River, Fort Warren, Ridgewood; Racquette Lake, Hamilton Co.; Queens Co.; Squaw Island, Niagara River; Troy (Pils.); Gannagagee Creek, Erie Co.; Alfred; Watertown; Canandarago Lake, Otsego Co.; Cedar Lake, Herkimer Co.; Old Forge (Walker); Sunset Creek, Otsego Co. (Smith); Chatauqua Lake (Maury); Schuyler's Lake, Otsego Co.; Mohawk River, Little Lakes and Erie Canal and Litchfield, Herkimer Co. (Lewis); Onondaga Co. (Beauchamp); Rochester (Walton); Huntington, Centerport, Long Island (Smith & Prime); Cayuga Lake (Ferriss MSS).

North Carolina: Asheville; Greenfield Pond, Wilmington (Walker).

North Dakota; Hankinson (Pils.); Fort Stevenson (Stearns).

Ohio: Columbus; Geanga Co. (Pils.); Hudson (Walker); Cincinnati (Harper and Wetherby); Tuscawaras Co. (Sterki); "The Reserve" (Naturalist).

Oklahoma: Oklahoma City (Ferriss); Cimmaron River (Call).

Oregon: Willamette River; Salem; Portland (Pils.).

Pennsylvania: Delaware River (type locality), Say; Allegheny River; Round Island, Clinton Co.; Port Allegheny, McLean Co.; Youghiougheny River, Connellsville, Fayette Co.; Juniata River, Hollidaysburg, Blair Co.; Susquehanna River, Muncy; Cushclishia Creek, Indiana Co.; Emporium, Cameron Co.; Amity Twp., Berks Co.; Beaver River, Waupum, Montgomery Co.; Germantown and various localities, Philadelphia Co.; Nockamixon, Bucks Co.; Schanksville, Somerset Co.; Glenolden, Delaware Co.; Gettysburg; Ligonier, Westmoreland Co., York Furnace, York Co. (Pils.); Allegheny Co. (Stupakoff); Ohio River, Coraopolis (Rhoads); Chester Co. (Hartman & Michener); Lancaster Co. (Haldeman); Columbia; Susquehanna River, Wilkesbarre (Walker).

Rhode Island: Providence and Worcester Canal; Cunliff's Pond (Carpenter).

South Carolina: None.

South Dakota: Mouth of Big Sioux River (Lea).

Tennessee: Emory River and Harriman (Pils.); Chilhowee Mts., Blount Co.; Franklin Co. (Walker); Tellico River, Blount Co. (Lewis); Little River (Ferriss MSS).

Texas: New Braunfels (Pils.); San Antonio (Walker); Pedernales River, Gillespie Co.; Brushy Creek, Williamson Co.; Colorado River and tributaries, Comal Co.; San Marcus River, Hayes Co.; Colorado River and tributaries, Travis Co.; Burton, Washington Co. (Singley); Hog Creek, McLennan Co. (Strecker).

Utah: None.

Vermont: Connecticut River, Hartland (Pils.); Middlebury (A ms)

Virginia: Luray (Pils.); Orange (Walker); Harper's Ferry (Tryon).

Washington: Cascades, Skamania Co. (Pils.).

Wisconsin: Milwaukee (Pils.); Menominee River; Wauwatosa; Honey Creek, Layton Park; Kinnickinnic River, Milwaukee; Golden Lake, Waukesha Co.; Little Cedar Lake, Washington Co.; Lake Winnebago, Calumet Co.; Kenosha (Chadwick).

West Virginia: Four miles from Romney; Kanawha River, forty miles south of Ohio River, Wirt Co.; North River, Sedan, Hampshire Co.; Warm Spring Creek, Morgan Co.; Salt Sulphur Spring,

Monroe Co.; Patterson's Creek, Mineral Co.; Potomac River, Cherry Run (Pils.); Potomac River, Harper's Ferry (Walker).

Wyoming: Yellowstone National Park (Stearns).

Dominion of Canada—Quebec: Meaches Lake, Hull; Chaudiere River; Chelsea (Pils.); Caprouge (Walker); Anticosti (Latchford); Brome Lake, Knowlton (Whiteaves MSS).

Ontario: Sparrow Lake, Simcoe District; Puzzle Lake, 40 miles north of Napanee; Rideau River; Ottawa River (Pils); Little River, Walkerville (Walker); Lake Simcoe (Stearns).

Algoma: Dog River, north shore Lake Superior; Gores Bay, Manitoulin Island, Lake Huron (Walker); Moose Factory, Hudson Bay (Dall).

Manitoba: Lake Winnipeg; Lake Manitoba (Christy).

Nova Scotia: Dartmouth Lakes (Jones).

Keewatin: Lake St. Joseph; Kawinogans River, Albany River. Knee Lake (Whiteaves); Saskatchewan River, Grand Rapids (Dall.);

New Brunswick: Kennebecasis River and elsewhere (Matthew and Stead).

Mexico: Yaqui River, Guaymas, W. Mexico (Stearns). See p.

Bibliography.

The following list includes all papers cited as authority for distribution in the preceding part of this paper. It is no doubt imperfect, as it embraces only such literature as has been accessible to the writer. For the sake of brevity many other papers examined, which afforded only duplicate records or simply a general "State" record are omitted:

Adams, C. B.—Shells of Fresh Pond. (Am. J. Sci. and Arts, O. S. XXXVI, p. 392, 1839.)

Adams, C. B.—Catalogue of the Mollusca of Middlebury, Vermont, and vicinity. (Am. J. Sci. and Arts, O. S. XI, p. 269, 1841.)

Aughey, Samuel.—Catalogue of the Land and Fresh-water Shells of Nebraska. (Bull. U. S. Geol. Survey III, p. 701, 1877.)

Baker, F. C.—The Mollusks of Cedar Lake, Indiana. (Naut. XVII, p. 113, 1904.)

Baker, F. C.—A Catalogue of the Mollusca of Illinois. (Bull. Ill. St. Lab. Nat. Hist. VII, p. 106, 1906).

Beauchamp, W. M.—Land and Fresh-water Shells of Onondaga County and State of New York (1886).

Call, R. E.—A Contribution to a Knowledge of Indiana Mollusca. (Proc. Ind. Acad. Sci. III, p. 150, 1894.)

Call, R. E.—The Hydrographic Basins of Indiana and their Molluscan Fauna. (Proc. Ind. Acad. Sci., 1896, p. 250.)

Call, R. E.—Contributions to a Knowledge of the Fresh-water Mollusca of Kansas. No. II, p. 54; No. IV, p. 123; No. V, p. 184; No. VI, p. 16.

Carpenter, H. F.—The Shell-bearing Mollusca of Rhode Island. (Random Notes on Nat. Hist. II, p. 96, 1886.)

Chadwick, G. H.—Notes on Wisconsin Mollusca. (Bull. Wis. Nat. Hist. Soc. IV, p. 83, 1906.)

Chickering, J. W., Jr.—List of Marine, Fresh-water and Land Shells found in the vicinity of Portland, Maine (1855 or 6?.)

Christy, R. M.—Notes on the Land and Fresh-water Mollusks of Manitoba. (J. of Con. IV, p. 248, 1885.)

Dall, W. H.—Land and Fresh-water Mollusks of Alaska. (Rep. Har. Alaska Exp. XIII, p. 87, 1905.)

Daniels, L. E.—A check list of Indiana Mollusca. (Rep. Dept. Geol. & Nat. Resources, Ind. 1902, p. 637.)

Daniels, L. E.—Records of Minnesota Mollusks. (Naut. XXII, p. 119, 1909.)

Ferriss, J. H.—Mollusks of Oklahoma. (Naut. XX, p. 17, 1906.)

Grant, U. S.—Conchological Notes. (14th Ann. Rep. Geol. & Nat. Hist. Survey of Minn., p. 122, 1885.)

Grant, U. S.—Notes on the Molluscan Fauna of Minnesota. (16th Ann. Rep. Geol. & Nat. Hist. Survey of Minn., p. 484, 1887.)

Haldeman, S. S.—Mollusca. (Rupp's Hist. Lancaster Co., Pa., p. 481, 1844.)

Harper, G. W., & Wetherby, A. G.—Catalogue of the Land and Fresh-water Mollusca found in the immediate vicinity of Cincinnati, Ohio, 1876.

Hartmann, W. D., & Michener, E.—Conchologia Cestrica, p. 70, 1874.

Henderson, Julius.—The Mollusca of Colorado. (University of Colo. Studies IV, p. 181, 1907.)

Hinkley, A. A.—List of Alabama Shells collected in October and November, 1903. (Naut. XVIII, p. 54, 1904.)

Johnson, C. W.—Shells of the Lake Region of Maine. (Naut. XXI, p. 106, 1908.)

Jones, J. M.—List of the Mollusca of Nova Scotia, 1877.

Keyes, C. R.—An Annotated Catalogue of the Mollusca of Iowa. (Bull. Essex Inst. XX, p. 13, 1889.)

Latchford, F. R.—Shells of Anticosti. (Am. Nat. XVIII, p. 1052, 1884.)

Lea, Isaac.—Report on Mollusca. (Explorations in Nebraska, Executive Doc. II, p. 72, 1859.)

Lewis, James.—Shells of Herkimer and adjacent counties in the State of New York. Proc. A. N. S., Phila., 1872, pp. 97–107.

Lewis, James.—Shells of Tennessee, No. 2. (Proc. P. A. N. S., 1872, p. 108.)

Lewis, James.—Fresh-water and Land Shells of Alabama, 1876.

Linsley, J. H.—Catalogue of the Shells of Connecticut. (Am. J. Sci. & Arts O. S. XLVIII, p. 281, 1845.)

Matthew, W. D., & Stead, G.—Land and Fresh-water Shells collected near St. John, N. B. (Proc. Miramichi Nat. Hist. Ass., No. III, p. 49.)

Maury, C. J.—Chatauqua Lake Shells. (Element. Nat. Hist. Series, No. I, p. 26, 1898.)

Moore, D. R., & Butler, A. W.—Land and Fresh-water Mollusca observed in Franklin County, Indiana. (Bull. Brookville Soc. Nat. Hist., No. I, p. 43, 1885.)

Naturalist.—Miscellaneous Observations, etc. (Am. J. Sci. & Arts O. S. XXXI, p. 36, 1837.)

Nylander, O. O.—Fresh-water Shells in the northeast of Maine. (Naut. XI, pp. 9–12, 1897.)

Plummer, J. T.—Scraps in Natural History. (Am. J. Sci. & Arts O. S. XLVIII, p. 95, 1844.)

Rhoads, S. N.—On a Recent Collection of Pennsylvania Mollusks from the Ohio River System below Pittsburg. (Naut. XII, p. 138, 1899.)

Rhoads, S. N.—A Glimpse at the Shell Fauna of Delaware. (Naut. XVIII, p. 66, 1904.)

Sampson, F. A.—Notes on the Distribution of Shells. (Kansas City Rec. of Sci. VI, p. 22.)

Sampson, F. A.—The Shells of Pettis County, Missouri, (Bull. No. 1, Sedalia Nat. Hist. Soc., p. 10, 1885.)

Sampson, F. A.—A Preliminary List of the Mollusca of Arkansas. (Ann. Rep. Geol. Sur. of Ark. II, p. 186, 1893.)

Sargent, H. E.—Annotated List of the Mollusca found in the vicinity of Clearwater, Wright Co., Minn. (Naut. IX, p. 127, 1896.)

Say, Thomas.—Nich. Encyc., 1st Ed., 1817.

Singley, J. A.—Texas Mollusca. (4th Ann. Rep. Geol. Survey of Texas, p. 314, 1892.)

Smith, Maxwell.—Shells of Richfield Springs, N. Y., and vicinity. (Naut. XX, p. 91, 1906.)

Smith, S., & Prime, T.—Report on the Mollusca of Long Island, N. Y., and its dependencies. (Ann. N. Y. Lyc. Nat. Hist. IX, p. 402, 1870.)

Squyer, Homer.—List of Shells from the vicinity of Mingusville, Montana. (Naut. VIII, p. 64, 1894.)

Stearns, R. E. C.—Observations on *Planorbis*. (Proc. P. A. N. S., 1881, p. 101.)

Stearns, R. E. C.—Notes and Comments on the Distribution of *Planorbis* (*Helisosma*) *bicarinatus*. (West. Am. Scientist, 1889, p. 110.)

Stearns, R. E. C.—List of Shells collected by Vernon Bailey in Heron and Eagle Lakes, Minn. (Proc. U. S. Nat. Mus. XXII, pp. 135–8.)

Sterki, V.—List of the Land and Fresh-water Mollusca of Tuscawarus County, Ohio. (18th Ann. Rep. Ohio St. Acad. Sci., p. 6.)

Strecker, J. K., Jr.—The Mollusca of McLennan County, Texas. (Naut. XXII, p. 65, 1908.)

Stupakoff, S. H.—Land and Fresh-water Shells of Allegheny County, Pa. (Naut. VII, p. 135, 1894.)

Taylor and Shiverick.—Catalogue of Shells found in and near the County of Bristol, Mass., 1840?.

Tryon, G. W., Jr.—Notes on Mollusca collected by Dr. F. V. Hayden in Nebraska. (Am. J. of Con. IV, p. 151, 1868.)

Tufts, Samuel, Jr.—A List of Shells collected at Swampscot, Lynn and vicinity. (Proc. Essex Inst. I, p. 30, 1856.)

Walton, John.—The Mollusca of Monroe County, N. Y. (Proc. Rochester Acad. Sci. II, p. 13, 1892.)

Walker, R. D., & Coolidge, W. H., Jr.—Mollusca of Keene, New Hampshire. (Naut. XXII, p. 32, 1908.)

Whiteaves, J. F.—List of Land and Fresh-water Shells from the District of Keewatin. (Rep. Geol. Surv. of Canada, 1905, p. 6.)

Whiteaves, J. F.—List of some Fresh-water Shells from Northwestern Ontario and Keewatin. (Ottawa Nat. XX, pp. 31–2, 1906.)

Explanation of Plate I.

All the figures are x 2, except Fig. 10, which is x 3.

Fig. 1. *P. bicarinatus aroostookensis* Pils. Collins' Mill Pond, Me.

Fig. 2. *P. bicarinatus aroostookensis* (topotype). Salmon Brook, Me.

Fig. 3. *P. bicarinatus* Say (typical). Delaware River, Phillipsburg, N. J.

Figs. 4 and 5. *P. bicarinatus angistomus* Hald. Independence Lake, Washtenaw Co., Mich.

Figs. 6–8. *P. bicarinatus unicarinatus* Hald (type). Schuylkill River, Pa.

Fig. 9. *P. bicarinatus portagensis* Baker (cotype). Portage Lake, Me.

Fig. 10. *P. bicarinatus corrugatus* Currier (type). Perch Lake, Kent Co., Mich.

Fig. 11. *P. bicarinatus royalensis* Walker (type). Siskowit Lake, Isle Royale, Mich.

Fig. 12. *P. bicarinatus percarinatus* Walker (type). Crystal Lake, Benzie Co., Mich.

NOTES.

An internal septum in Holospira bartschi.—In a specimen of this snail cut open there is a vertical septum across the cavity at about the middle of the eighth whorl. It is concave on the lower side, as in many *Urocoptidæ*. To abandon the early whorls is very common in Antillean and the larger Mexican forms but has not before been noticed in *Holospira*. The internal column in *H. bartschi* is very nearly one-third the diameter of the shell at the widest part, but it decreases to about one-fourth in the penultimate whorl.—H. A. Pilsbry.

THE NAUTILUS.

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A SPRING COLLECTING TRIP.

Notes on New England Nudibranchs II.

BY FRANCIS N. BALCH.

In a recent number of the "Nautilus"[1] I recorded two occurrences of nudibranchs at Cohasset, Mass., indicating marked local condensation of the partly grown Eolid population during the time of a supposed autumn migration of the year's brood to deeper waters.

The condensation of adults at the breeding season is of quite a different order and much more familiar. The supposition is that the year's adults migrate from deep water to the shore, there to spend a brief mating season, spawn, and (for the most part) die. It is well known that early spring is the breeding season for most of the species, while others appear to select late autumn or winter—facts which go far to explain our woeful ignorance of this group in this country. At times, in other countries, these mating forms have been found abundant and gregarious to such an extent as to justify the expression "swarming" for the habit.[2]

[1] Vol. xxii, No. 2, June, 1908, pp. 13–16. "Two interesting New England Nudibranch Records." The sub-title "Notes on New England Nudibranchs. I." was accidentally omitted by the printer. P. 15, top line, after word "and" insert "T." For other errata see Nautilus, xxii, No. 6, Oct., 1908, p. 60.

[2] I use the term "swarming" in this paper to indicate a distinct gathering together, in *relatively* great abundance, for breeding.

Eliot ("On some Nudibranchs from East Africa and Zanzibar." Pt. V.; P. Z. S., 1904, ii, p. 87) furnishes a description of such a "swarming" of *Trevelyana crocea*,

From April 26 to 30, 1908, I was able to devote a short vacation exclusively to a minute examination, as exhaustive as time permitted, of the nudibranch life on two short stretches of coast suitable for breeding Eolid nudibranchs. The first was a stretch of granite ledges and piles of broken boulders at Rocky Neck, in Gloucester Harbor; the second a stretch of granite ledges at Brace's Cove, on the outer (eastern) side of Eastern Point, Gloucester, Mass. The localities were quite unlike in biological character, though resembling each other as shore formations. The Rocky Neck locality was bathed by the comparatively warm and still waters of the harbor, thick with larvæ, eggs, spores and organic débris of all kinds. Innumerable small and rather deep pools among the broken boulders, thickly hung and often completely choked with fuci, sheltered abundant animal life, including *Metridium* and hydroids. The Brace's Cove locality was pounded by the eternal surf of the open Atlantic, and the water was noticeably colder and crystal-clear. The pools on the massive ledges were much larger, shallower and more open. Corralines were abundant, hydroids and *Metridium* much fewer.

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a Polycerid from Zanzibar, as follows: "* * * this form provided a most striking case of the migration of molluscs in flocks to shallow water for the deposition of spawn. But a few specimens were collected before a certain period of a few days' duration, when the sand of Chuaka Bay just below low-tide mark was occupied by astonishing numbers * * *. These were not washed up by accident, but were all actively crawling on the sand among the weeds, etc. Many were *in coitu*, and when placed in basins of sea-water most of the specimens were soon engaged in copulation or the deposition of yellow egg-ribbons. By-and-by the swarm disappeared to some unknown permanent habitat. If this were in the deeper channels of the bay (1 to 2 fathoms deep at low tide) they must have been found there by dredging. As this was not the case it seems most probable that the migrations of these tiny animals extend to and from the deep sea three or more miles away."

One may be permitted to guess that the "unknown permanent habitat" to which "the swarm disappeared" was that bourne from which no traveler returns! Quite probably the form may be found to be strictly annual with little or no overlap of generations, as I believe is the case with various of our own forms. Either the young escape observation till just about the breeding season (possibly making a very sudden and rapid growth at that time which may be marked by a change in food supply) or else, and more probably, the young straggle back to deep water as they grow stronger, but while still small, and, there attaining their growth, make a sudden descent (or ascent!) upon the shore *en masse* at the next call of the breeding impulse.

No temperatures were taken, for on the face of it the temperature was not the controlling factor at that time and place, the same forms and spawn occurring indifferently in shallow, sun-warmed pools pleasant to the hands, and in deep, unsunned crevices at extreme low tide when one's breath condensed in clouds over the numbing water. This is not to say that temperature may not be the controlling factor in the initiation of the migration impulse or even in the actual deposition of spawn, which latter may perhaps always take place at high water when the temperature conditions of the pools would be equalized.

The section worked at Rocky Neck did not exceed 300 yards in length, and at Brace's Cove about 200. Three days were given to the former and one to the latter. Every day-light tide was worked industriously, and attention was wholly concentrated on nudibranchs.

The "census" was as follows:

Coryphella rufibranchialis mananensis (Stimps.),[1] typical, 43 specimens collected and about 30 more seen—total, say 75. All but 6 at Rocky Neck. All well-grown, if not fully adult, except three or four apparently about half-grown.

Coryphella rufibranchialis chocolata var. nov. Externally not separable by me from the foregoing except by the color of the cores of the cerata and of the body, which is a true chocolate-brown, dark for the cerata, light for the body, as contrasted with the varied reds (varying from pink to ginger, salmon and scarlet) of the typical form. The dentition and internal anatomy have not yet been examined, but as there is undoubtedly intergrading in the color, no very distinctive character should be anticipated. I have seen this form before, but never more than one or two specimens at a time. As a mere color variety (and for all we actually know, a mere physiological phase) it may be thought not worth a name. At the same time the intergrades are few and the series incomplete; and the chocolate forms, in life, occurred markedly segregated from the others. It is at least possible to point out a tangible character by which it differs from typical *mananensis*, which no one has yet done for the differentiation of *mananensis* from *rufibranchialis*. Should *mananensis* prove

[1] So called by me for the present in the provisional belief that Stimpson's form—if separable at all, which I doubt—is only a variety of the European form. Our knowledge, and consequently the nomenclature, of the group of red-gilled Eolids on this coast is in deplorable condition.

a complete synonym (as Gould thought it), or a variety (as I consider it), then *chocolata* should be written as above; but if *mananensis* is a valid species (as Professor Verrill holds), then *chocolata* may be written as its variety pending further knowledge. Ten specimens collected, all at Rocky Neck.

Aeolidiella papillosa (L.). It is a question whether our American form may not be as well worth a varietal name as our form of *Coryphella rufibranchialis*. Both species are, in European waters, noted for their variability, and have enormous synonymies. I think it much the same sort of question as that whether it is worth while to distinguish our form of *Purpura lapillus*—doubtless it is extremely close to the European form, and no one has yet pointed out a constant diagnostic difference, yet an American lot could hardly be confused with a European lot. Our form of the present species, in my experience, runs shorter, stouter, pinker and less variegated than the European form, as shown by the numerous and excellent figures accessible. No diagnostic character has been found in the dentition. Eight specimens collected, of which four at each locality; one a giant of 9 cm., one of an ordinary full adult size of about 6 cm., three smaller adults of 4–5 cm., and one young of about 1 cm.

Cratena veronicæ Verrill. One specimen about 1.8 cm. long, taken at Rocky Neck among a thick growth of undetermined hydroids, agreed very closely with Verrill's description of this rare and unfigured species. It was kept alive four days during which colored drawings were made, and then preserved for dissection.

Galvina picta (A. & H.), one specimen, adult. Rocky Neck, on hydroids.

Doto coronata (Gmel.), one specimen, adult. Rocky Neck, on hydroids.

Dendronotus frondosus (Ascanius), three specimens, one large adult of about 6 cm., two about half that size; the latter at Rocky Neck, the former at Brace's Cove.

Acanthodoris pilosa (Müller), one specimen of about 1 cm., at Brace's Cove.

Lamellidoris aspera (A. & H.),[1] eighteen specimens, 5 mm. to 12 mm. long, all but three or four at Brace's Cove, on Corallines.

[1] Our knowledge of the difficult and critical group of species centering around *L. aspera* and including a number of quite insufficiently characterized American forms has not reached a point where identifications can be looked on as reliable.

Ancula cristata sulphurea (Stimps.), one young specimen of about 8 mm., at Brace's Cove. It seems best to preserve Stimpson's name at any rate in a varietal sense though Bergh has united it with *cristata*. The differential character of the lower origin of the anterior appendages of the rhinophores is fully confirmed by my observation and seems pretty constant.

Total about 119 individuals, falling into 9 genera and 10 species or varieties.

The picture of local nudibranch life obtained from this bit of intensive collecting is tolerably clear.

Coryphella rufibranchialis mananensis appears to have been "swarming," not in the sense that it was enormously numerous—for the total figures are not impressive—but in the sense that adults were locally gathered together in far greater numbers than normal and with a distinctly gregarious habit, *e. g.*, six or eight in one pool, none in the next, rarely alone. The specimens ran remarkably uniform in size and lent support to the view that the species is an annual. None were seen *in coitu* either in the pools or in three days of captivity, but spawn was abundant and probably mating was about over for the year. Alder and Hancock say of the British form: "met with * * * in April, May and June, when it has attained its full size and is spawning. * * * In August and September the young are found considerably advanced." I believe our form will be found to have a more concentrated breeding season.

What has been said applies equally to the chocolate variety.

Aeolidia papillosa gave some slight indication of "swarming" in that it was considerably more numerous than normal, and gregarious in habit. But this was not nearly as marked as in the foregoing and the sizes were so conspicuously *not* uniform as to look against its being an annual. What I have seen in this and other years would fit well with its being a bi- or tri-annual with a "swarming" habit slightly later than that of *C. mananensis* and not so well marked. The spawn was fairly abundant and *all* of a *deep* rose color whereas Alder and Hancock say of the spawn of the British form that it is "occasionally white, but generally has a pinkish tinge, and is sometimes distinctly rose-colored." They give the breeding season as "spring and summer months."

The other forms taken present no indication of a sexual "swarm-

ing." It is true *Lamellidoris aspera* occurred in some numbers but the individuals varied much in size, were not markedly gregarious, and no spawn or coition was seen. The species seems to be a fairly common one at most times and according to Alder and Hancock breeds in May, June and July,—if indeed our species be identical.

None of the species taken are rarities except the var. *chocolata* (which, however, I have several times seen before) and *Cratena veronicæ*, which has not before been publicly reported since its original description, but has been taken a few times by Verrill in comparatively deep water. The present specimen is about three-quarters the size given by Verrill. One may hazard a guess that it will be found to have a shore breeding season sometime in the winter.

The other species are those we have often with us on the shore in very small numbers. While such of them as are hydroid feeders are almost necessarily to some extent gregarious, I know of no account of anything like a "swarming" of any of them except *Ancula cristata*.[1]

There is a certain fascination about the mysterious appearances and disappearances of these beautiful wanderers, and the first student fully to master a nudibranch (or at any rate an Eolid) life-history will have an interesting story to tell.

A collecting trip like this gives endless opportunity for alleged "observations" on "protective" and "warning," coloration and the like, which would be worth recording if fishes or other enemies looked with human eyes, from air into water, in full daylight, and *from on top*. Any true advance in this direction must be along the lines of work like Herdman and Clubb's most interesting experiments.[2]

52 Eliot St., Jamaica Plain, February, 1909.

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[1] Herdman and Clubb. Third Report upon the Nudibranchiata of the L. M. B. C. District, Proc. and Trans. Liverpool Biol. Soc., iv, 1890, p. 134. "This species (*A. cristata*) was found * * * in April, 1890, and we took it in extraordinary profusion * * * in March, 1890. On one reef of rocks especially, a little way above low-water mark, there must have been many thousands of specimens present. For yards it was impossible to walk without treading on them, and handfuls were readily collected by scraping the specimens together from the mud-covered rocks." It should be remembered that for some reason the British coast supports nudibranch life in a vastly greater abundance of individuals, as well as of species, than ours does.

[2] *Loc. cit., ante*, pp. 150–163.

NEW ENGLAND PYRAMIDELLIDÆ, WITH DESCRIPTION OF A NEW SPECIES.

BY HENRY W. WINKLEY.

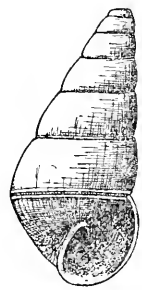
A very excellent work on the New England *Pyramidellidæ* by Mr. Paul Bartsch has just been published by the Boston Society of Natural History. Specimens from the writer's cabinet were used in compiling this work. Unfortunately there are some omissions. I can blame no one but myself. My excuse is that my specimens were packed and stored, and a few collected later had not been worked up. Hence this supplement.

Turbonilla (*Ptycheulimella*) *polita* Verrill. Four specimens (determined by Verrill) are in the author's cabinet. The two best ones have ten whorls, and measure 7.5 mm. They are from Eastport, Maine.

Five specimens of *Odostomia*, collected at Provincetown, have the many lines of *trifida bedequensis*. They are about the size and shape of the P. E. I. specimens, and probably of that variety.

Odostomia (*Odostomia*) *modesta* Stimpson. Two excellent specimens of this species were found at Provincetown. They are slightly larger than the specimen used to illustrate Bartsch's article.

Odostomia bisuturalis. An interesting variety lacking the revolving line, occurs at Provincetown. Mention may be made of three pathological specimens of this species found at the same place. Deep sutures and everted lip, they are one of nature's jokes.



PYRAMIDELLA (SULCORINELLA) BARTSCHII n. sp. Fig.

Shell broadly conic, semi-transparent, vitreous. Nuclear whorls small, deeply obliquely immersed in the first of the succeeding turns,

above which only the tilted edge of the last volution projects. Post-nuclear whorls well rounded, moderately contracted at the sutures and appressed at the summit, which falls in the middle of the peripheral sulcus. Periphery of the last whorl somewhat inflated, marked by a moderately deep sulcus, which is bounded on each side by a slender raised thread. Base short, well rounded, with a moderately broad umbilicus. Entire surface of spire and base marked by strong lines of growth and numerous fine spiral striations. Aperture large, rhomboidal; posterior angle obtuse; outer lip thin; columella slender, curved and revolute, provided with a strong fold at its insertion.

The type is in the Winkley collection, and comes from Woods Holl, Mass. It has seven post-nuclear whorls and measures, length 3.2 mm., diameter 1.6 mm.

I take pleasure in naming this for Mr. Paul Bartsch, of the Smithsonian Institution, and wish to express my thanks to him and Dr. Dall for their help on this and other species.

Mr. Bartsch writes concerning the above: "The single specimen is a most interesting one; it represents a group (*Sulcorinella*) not heretofore reported living."

A NEW CARINIFEX FROM THE SANTA CLARA LAKE BEDS (PLIOCENE), CALIFORNIA.

BY HAROLD HANNIBAL.

CARINIFEX SANCTÆCLARÆ n. sp.

Shell small (for the genus), heavy, subglobular; spire depressed; whorls three, inflated, subcarinate at outer margin above, from which the shell slopes concavely upward to a raised ridge bordering a narrow, rather deep sutural groove. Umbilicus narrow, marked off by a sharp carina; lip complete, semilunar, full, reflexed below. Shell marked by moderate, diagonal growth-lines, occasionally raised into coarse ridges. Alt. 5 mm., lat. 8 mm.

Type locality: Near Los Gatos Limestone Quarry, Los Gatos, Santa Cruz Mts., Cal.

This species is easily recognized by the concave upper surface of the whorls. It varies somewhat in size, some specimens being twice as large as the type, which is probably just mature.

It and *Amnicola yatesiana* J. G. C. are the two characteristic

species of the Santa Clara Lake beds. Cooper[1] listed it as *Carinifex newberryi* var. *minor*, which he had described previously, from Clear Lake (living). The two have nothing specific in common except their size.

Associated with these two species at various points about the valley are the following species still living in northern California:

Anodonta cygnea nuttalliana Lea.

Anodonta angulata Lea.

Pompholyx effusa Lea.

Valvata virens Tryon.

In addition there are several indeterminate forms, an excellent flora, and fragments of mammalian bones.

The figure, which will appear in a later issue, represents the type, x 2, from a photograph by John Howard Paine, of Stanford University.

Stanford University, Cal.

NOTE ON PLANORBIS BINNEYI TRYON.

BY FRANK COLLINS BAKER.

Mr. Winkley's note on "Variation" in the last NAUTILUS is very interesting, and most of the examples given are characteristic. On page 16, however, there is a reference to *Planorbis* which shows that several species have been confused. The Dalton shells are *binneyi* and not *trivolvis*, as I have ascertained recently from an examination of specimens in the Boston Society of Natural History, received from Mr. Winkley.

This large *Planorbis*, surpassed only by the *magnificus* of Pilsbry, has often been confused with *trivolvis*, most authors overlooking Tryon's reference to this species in his review of Binney's work in the American Journal of Conchology.

P. binneyi is a northern form, in many localities replacing *trivolvis*. I have collected it in Tomahawk Lake, Wisconsin, and in the St. Lawrence River at Thousand Island Park. It may be known by its large size, very *wide* whorls and pronounced longitudinal sculpture. Specimens of the same size are much wider than *trivolvis* and more

[1] Cooper, J. G., Proc. Cal. Acad. Sci. (2), iv, p. 172, 1894.

corpulent. It has been identified as *corpulentus* Say, but this is a totally different species, the characters of which have been very fully described by Mr. Bryant Walker in a previous volume of the NAUTILUS.

It would be interesting to know the exact range of *binneyi*, and I would suggest that conchologists generally examine their collections for this species, sending the information to either Mr. Walker, of Detroit, or to me (or to both of us).

A large amount of exact data is needed to accurately determine the range of the various species of fresh-water pulmonates, and a few notes on this magnificent *Planorbis* will aid materially in this direction.

PISIDIUM MARCI, N. SP.

BY V. STERKI.

Mussel rather small, well inflated, high, slightly inequipartite and oblique, with outlines well rounded; superior margin short, nearly straight, with a rounded angle at its posterior end and a very slightly marked one at the anterior; posterior and inferior margins forming one regular, nearly circular curve, supero-anterior slope slightly marked; beaks little posterior, large, somewhat flattened, well prominent; surface shining, with medium fine, irregular striæ and several distinct lines of growth, the upper one marking off the nepionic mussel (as in *Musculium*); color straw to yellowish-horn,[1] with slightly marked lighter and darker zones; hinge short, rather slight, but well formed, with a short ligament, plate narrow; cardinal teeth somewhat curved; the right one moderately long, its posterior part thicker and grooved; left anterior very short, "high," abrupt, thin, the posterior almost longitudinal, twice as long as the anterior, less "high," slightly thicker and grooved in its posterior part; lateral cusps short, pointed, the outer ones of the right valve smaller but distinct, not pointed.

Long. 3.5, alt. 3.4, diam. 2.5 mm.

Habitat: Mt. Leidy, Utah, at 10,000 feet, in a stagnant pond, collected by Mr. Marcus H. Dall (son of Dr. Wm. H. Dall), in whose honor the species is named, on September 18, 1905.

This *Pisidium* appears not to be closely related to any of our

[1] Most specimens appear brownish from the dried soft parts.

described species, and cannot be referred to one, even taking into account the high altitude and the nature of the locality. It somewhat resembles some high forms of *P. scutellatum* St., but is less oblique, has broader beaks, and the surface striæ are coarser. The short, pointed inner lateral cusps of the right valve are notable. The nine specimens in the lot are remarkably uniform, two of them somewhat over half grown, the others apparently mature. The one opened for examining the hinge contained no visible embryos. The types are in the U. S. Nat. Mus., No. 187491.

NOTES.

A GIANT SQUID.—I received a letter to-day (April 2, 1909) from Provincetown which contains an item I think should go on record. It is as follows:

"The schooner 'Annie Perry' found a giant squid off Highland Light, Truro, Mass., last week and tried to hoist it on board the vessel, but the rope cut the body in half. It was perfectly fresh, and the crew took some of it for bait and caught quite a number of fish. I saw one of the tentacles which they brought ashore, and it was perfectly fresh then. It was seven feet six inches long, and the suckers were as large as a silver quarter. A piece of the body was, I should think, four inches in thickness and the tentacles must have been four inches in diameter at the larger end."

The above must be the first record of the giant squid on our coast, although they must exist off shore in deeper water. I have written to see if I can secure the beaks or any part to aid in its identification.

(April 16, 1909.) I have received a little more information in regard to the giant squid taken off Highland Light, Truro. A letter to-day says:

"The captain of the vessel who took the squid says it was a very little larger than their dory, which is 16 or 17 feet in length. The tentacle which they brought ashore was $7\frac{1}{2}$ feet long and had 'sucker cups' the *whole length* of it." [This would show it was one of the shorter tentacles.] "The whole animal was shaped like the common squid, that is, the body was not globular like the cuttlefish, but had fins or flippers on the tail just like the common squid. The piece which I wrote about was cut out of the side, and about four inches thick, and the whole body was about as large around (circumference)

as a fish-barrel. The tentacle was 7½ feet long, four inches thick at the big end, and tapering away to a point."

The above is what was written to me, but my correspondent could not get any of the suckers, as the tentacle was thrown away before he received my letter.—J. HENRY BLAKE.

18 Prentiss St., Cambridge, Mass.

DR. VICTOR STERKI, of New Philadelphia, Ohio, known for his work on North American *Sphaeriidæ* and *Pupillidæ*, has been appointed an assistant in conchology in Carnegie Museum, Pittsburg. Dr. Sterki's collection became the property of the Museum some years ago.

FERGUSON COLLECTION.—It will no doubt be a matter of interest to the readers of THE NAUTILUS to know that the large and important collection of the late David Wilson Ferguson has been presented to Columbia University by his sons, W. C. Ferguson, Esq., and Professor George A. Ferguson, of Columbia. A room has been assigned for the exhibition of the collection in its entirety.—C. DAYTON GWYER.

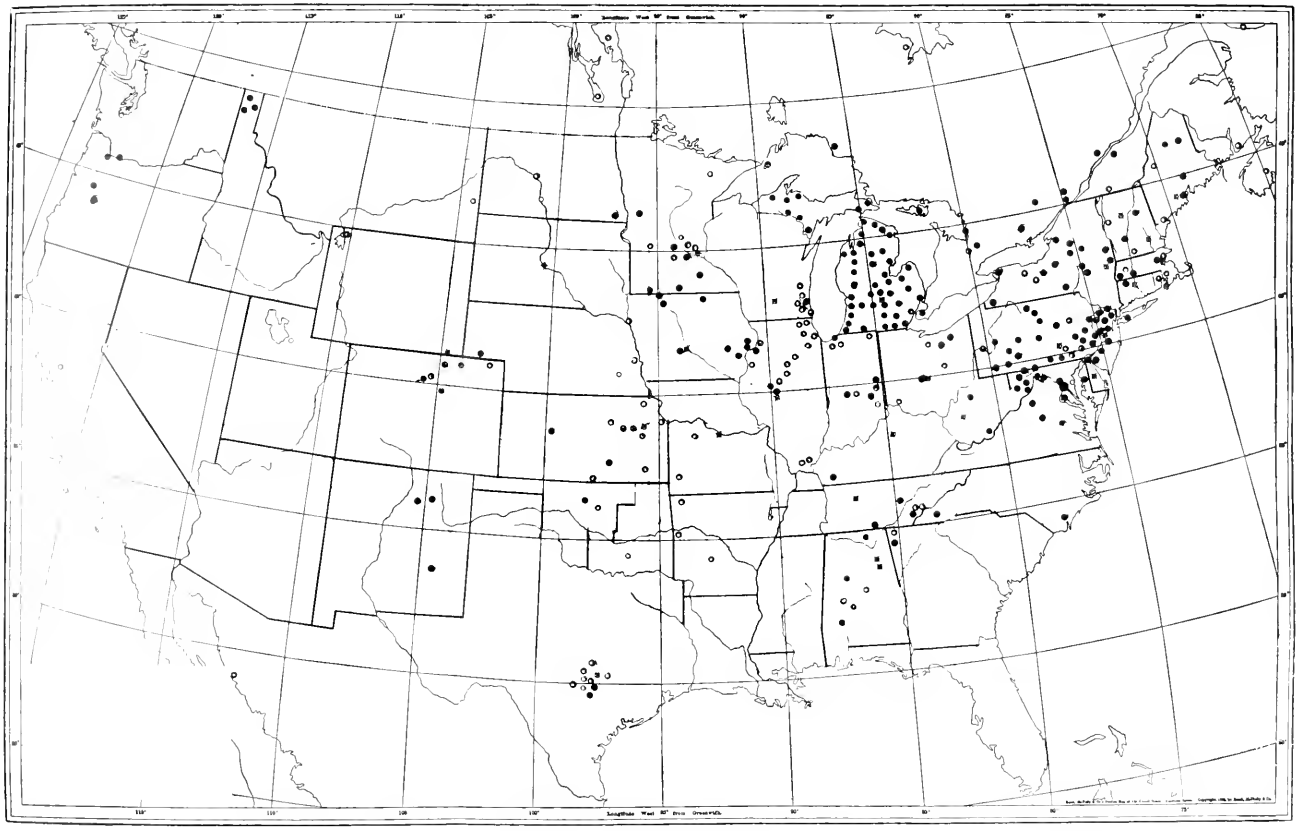
THE CONCHOLOGICAL MAGAZINE.—With the April number (Vol. iii, No. 4), Mr. Y. Hirase has decided to suspend the publication of his journal until about May, 1910, when "No. 5, Vol. iii, will be sent to you in a finer and larger form." It is to be hoped that conchologists will support more generally this valuable publication, the plates alone being worth more than its subscription price. In the later numbers many new species have been described.

THE August number of THE NAUTILUS will again be omitted, owing to the absence of the editors during the greater part of July and August. The usual number of pages will be given by increased size of other months.

THE latest test when he comes home at 2 a. m. is to make him try to sing the chorus of the song:

She sells seashells on the seashore,
The shells she sells are seashells, I'm sure,
For if she sells seashells on the seashore,
Then I'm sure she sells seashore shells.

If he can, he's all right.



DISTRIBUTION OF PLANORBIS BICARINATUS.

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THE NAUTILUS.

VOL. XXIII. AUGUST-SEPTEMBER, 1909. No. 4

MOLLUSKS FROM NORTHEASTERN MEXICO.

BY H. A. PILSBRY.

These shells were collected by Mr. A. A. Hinkley during the past winter, in the state of San Luis Potosi, Mexico. The Panuco river system has proved to be unexpectedly rich in fresh-water mollusks, having a fine group of *Unionidæ*, a remarkable lot of *Pachychili*, a new genus of *Pleuroceratidæ*, a *Gundlachia*, and various interesting *Amnicolidæ*. Among the latter there are several genera unlike any known American forms, and related to genera of the Old World. I have elsewhere called attention to a little snail found by Mr. Hinkley last year, *Coilostele tampicoensis*, which is closely allied to species of Spain, Syria and Arabia, but of a genus not before known in the western world. The two genera following, *Emmericia* and *Pterides*, seem to be similarly allied to European groups, and are certainly quite unlike any other American *Amnicolidæ* yet known.

EMMERICIA.

This genus was established by the late Professor Spiridion Brusina, of Agram, for a group of fresh-water snails resembling *Bithynia* in shape, but having a paucispiral operculum and a thickened, expanded lip, behind which there is a rounded ridge or wave. The species inhabit Dalmatia and the adjacent region around the head of the Adriatic Sea. The commonest and typical species is *E. patula* (Brumati).

Several species found in the state of San Luis Potosi by Mr. Hinkley are so close to *Emmericia* in conchological characters that I do not feel justified in separating them generically from that group,

though when the soft parts and operculum come to hand it is quite possible that the Mexican snails may prove to be generically distinct from the Dalmatian. They differ chiefly by wanting a swelling behind the expanded lip, and for this reason I erect for them the subgenus *Emmericiella*, type *E. novimundi*.

The Oriental group *Tricula* Benson, with a few Indian and Philippine species, resembles *Emmericiella*, but the inner lip is straightened, making the aperture narrow and piriform.

EMMERICIA (EMMERICIELLA) NOVIMUNDI n. sp. Pl. 5, figs. 9, 10.

The shell is imperforate but openly rimate, rather solid, ovate-conic, smooth and glossy. The spire is straightly conic, apex obtuse, the tip being depressed. Whorls $4\frac{1}{2}$, convex, separated by rather deep sutures; last whorl well rounded, ascending to the aperture. The aperture is oblong, vertical, or has the basal lip a little advanced. Peristome continuous, well expanded, thickened on the face and within; the outer lip is just perceptibly retracted near the upper insertion; basal margin well rounded; columella concave, thick. Parietal callus heavy, adnate, but with distinct edge in fully adult shells, spreading forward in front of the aperture. Length 3.1, diam. 1.9 mm.; longest axis of aperture, including peristome 1.65 mm. (fig. 10).

Bank of Choy River near the cave, State of San Luis Potosi.

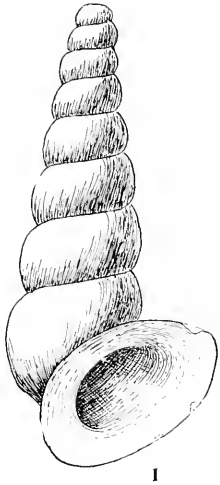
The specimens are bleached; color in life unknown. These are two perfect examples of the same size. With these are associated several decidedly larger shells, in which the apex is broken, probably one whorl being lost. One of these—figured in profile, fig. 9—measures, length 3.5, aperture 1.9 mm., 4 whorls remaining.

EMMERICIA (EMMERICIELLA) LONGA n. sp. Pl. 5, figs. 11, 12.

The shell resembles *E. novimundi* but is more shortly rimate, of a turrited shape, with $5\frac{1}{3}$ more convex whorls. Aperture is more produced forward below, and the parietal callus spreads forward less. The outer and basal margins are well expanded. Length 4.1, diam. 2, longest axis of aperture including lip 1.6 mm.

Two complete and one broken specimen, found with the preceding species.

The new subgenus EMMERICIELLA is proposed for American Emmericiæ, in which there is no wave or ridge behind the lip-expansion, and the columellar margin of the aperture is built forward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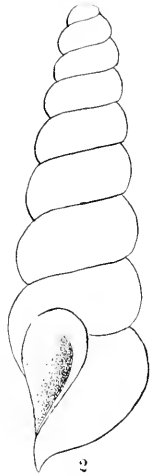
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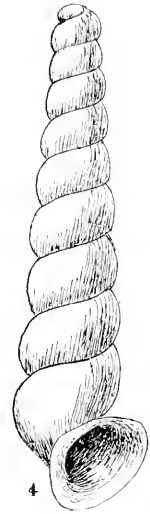
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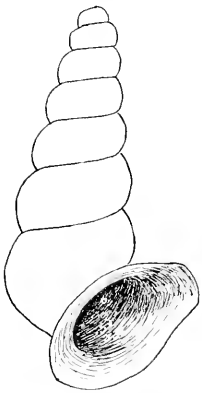
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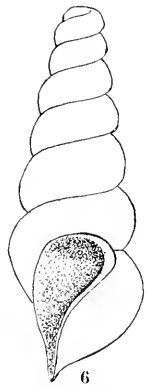
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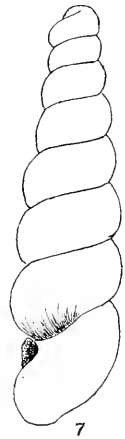
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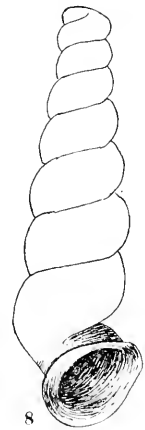
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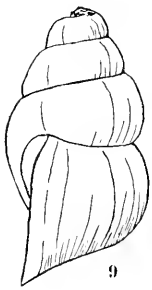
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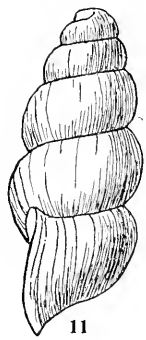
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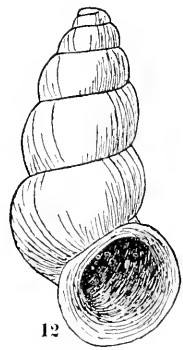
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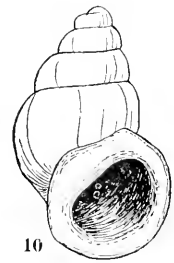
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EMMERICIA AND PTERIDES.

more than in European forms, forming a conspicuously rimate umbilical region. Type *E. novimundi*.

PTERIDES, n. gen.

The shell is minute, rimate, long and narrow, composed of many convex whorls, (7 to 10 in known species); apex obtuse, the first whorl large. Aperture small, diagonal, elliptical, the peristome thin, continuous, expanded throughout or at the ends, where it is retracted to form shallow spout-like sinuses. Operculum and soft parts unknown. Type *P. pterostoma*.

These remarkable little snails are without relatives among known American genera. They may be compared only with a genus found about forty years ago in the flood-débris of the rivers of southern France and Spain, and described by Bourguignat under the generic name PALADILHIA,[1] and with another group, LARTETIA[2], described from quaternary fossils found around Paris, but now known to inhabit subterranean waters and springs of central Europe, where most of the German species have been described as *Vitrella* Clessin.

Both *Paladilhia* and *Lartetia* are small, slender shells with the aperture ovate, the outer lip bending forward below, retracted near the upper insertion. In *Paladilhia* there is a rather narrow, Pleurotomoid notch above, leaving a sort of indistinct sinus-band; in *Lartetia* there is only a broad, rounded sinus. In my opinion the two groups are not generically distinct, *Lartetia* being at most a subgenus of *Paladilhia*.[3]

These forms, and especially the *Lartetiæ*, are apparently the nearest allies of the Mexican *Pterides*, which differs from them chiefly by the diagonal, oblong aperture with broadly expanding lip.

[1] *Paladilhia* Bourguignat, Monographie du Genre Palad., 1865. The type, *P. pleurotoma* Bgt., is a snail measuring 4x2 mm., found in the drift débris of the Lez, a little river near Montpellier, dept. de l'Hérault, and believed to inhabit subterranean watercourses.

[2] *Lartetia* Bourguignat, Catalogue des Mollusques terrestres et fluviatiles des environs de Paris a l'époque Quaternaire (in E. Belgrand: Le Seine—1, Le Bassin Parisien aux âges Antéhistoriques), pp. 15, 17 (1869). Type *L. belgrandi* Bgt.

[3] The normal forms of the genus are those called *Lartetia*, *Paladilhia* being an extreme development in one or two species only; but the latter name has priority for the genus, having been described in 1865, while *Lartetia* dates from 1869.

PTERIDES PTEROSTOMA n. sp. Pl. 5, figs. 1, 2, 5, 6.

The shell is rimate, long and slender, composed of numerous slowly increasing, strongly convex whorls. Apex obtuse. Aperture diagonal, obliquely oval. Peristome thin, continuous, very broadly expanded, retracted and more broadly spreading at the two ends, where it is somewhat spout-like. Color unknown, the specimens being bleached.

Length 2.25, diam. of last whorl above aperture .75 mm.; longest axis of aperture 1.1 mm.; whorls 7 (figs. 5, 6).

Length 2.75, diam. above aperture .8, longest axis of aperture 1.2 mm.; whorls $8\frac{1}{2}$ (figs. 1, 2).

Eight specimens examined. There is considerable variation in length and number of whorls. Figs. 5, 6 represent the type.

PTERIDES RHABDUS n. sp. Pl. 5, figs. 3, 4.

The shell is very slender, slowly tapering to the rather large summit, composed of nearly 10 very convex whorls separated by a deep suture; last whorl very convex. Aperture small, elliptical, diagonal, rounded at both ends. Peristome thin, continuous, somewhat expanded, deeply sinused above, the parietal margin adnate for a short distance. Length 3, diam. above aperture .75, longest axis of aperture .7 mm.

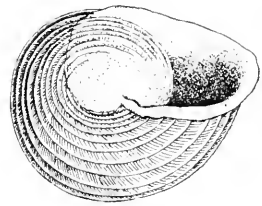
Choy River near the cave, San Luis Potosi, Mexico.

This species is much narrower than *P. pterostoma*, with more whorls and a smaller aperture. The outer lip may perhaps become more expanded with further growth; if so it would apparently be like that of *P. pterostoma*. Described from a single specimen. While it may possibly prove to be an extreme form of *P. pterostoma*, I do not feel justified in uniting such unlike forms without evidence of intergradation.

PTERIDES BISINULABRIS n. sp. Pl. 5, figs. 7, 8.

The shell is very slender, slowly tapering from the very obtuse apex, composed of 8 smooth, strongly convex whorls, the last half of the last whorl free from the preceding. Aperture diagonal, elliptical, the peristome continuous, free, thin, hardly expanding except at the two ends, where it is retracted, slightly produced and flaring. The outer margin is arched a little more than the inner. Length 2.5, diam. above aperture .7, longest axis of the aperture .65 mm.

1



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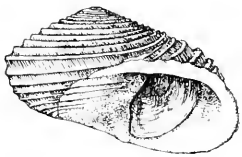

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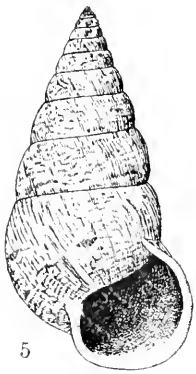

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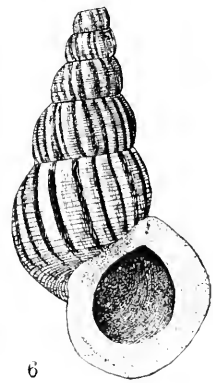


6

NEW CUBAN LAND SHELLS.

Gannina River, three miles S.-W. of San Dieguito, State of San Luis Potosi. A single specimen taken.

Smaller than *P. pterostoma* with the last whorl free, the aperture sinused at both ends, and the lip hardly expanded.

DESCRIPTIONS OF TWO NEW CUBAN LAND SHELLS.

BY DR. CARLOS DE LA TORRE, HAVANA, CUBA.

MACROCERAMUS HENDERSONI n. sp. Pl. 4, fig. 5.

The shell is perforate, conic-turrited, thin, the last 5 whorls corneous-brown, profusely and finely mottled with opaque white, with a series of irregular, lengthened brown spots at the periphery, showing above the suture on the spire; first $2\frac{1}{2}$ whorls blackish-brown, the next two dark, broadly maculate with white. Surface glossy, the first 4 whorls smooth, the rest closely and finely striate, the striæ low, as wide as their intervals, and very oblique. The spire is straightly conic, apex rather acute. Whorls 11, slightly convex, separated by a smooth suture, the last whorl well rounded peripherally and beneath. Aperture very oblique, ovate, marked with brown inside. Peristome expanded and reflexed, yellow or pale red. Columella brown, short, dilated, and having a rather strong but short fold above. Parietal callus transparent. The internal axis is slender and distinctly twisted spirally.

Length 19, diam. 9.5, length of aperture 8 mm.

Length 20, diam. 9.8, length of aperture 8 mm.

Length 18, diam. 9.5, length of aperture 8 mm.

Sierra de Cubitas, Camaguey, Cuba.

This species is very distinct from all others now known, differing from the *canimarensis* group by the total absence of a basal carina, and from the forms prevalent in Eastern Cuba by its thin texture, sculpture and coloration. It is one of the largest and finest of the Cuban species.

The coloration is very well shown in the figure. Besides the profuse and fine mottling with white there are occasional longitudinal white flames, bordered on the left side with dark, unmarked spaces.

CHONDROPOMA HENDERSONI n. sp. Pl. 4, fig. 6.

The shell is umbilicate, conic-turrite, narrowly truncate, rather solid. Last four whorls rather closely and subregularly marked

with slightly oblique stripes of red-brown, ochre, blue and white, the base red with white radial streaks; when whorls above the last four are retained they are scarlet with some white streaks.

The surface is glossy, with traces of fine, nearly effaced growth-striæ, and under close inspection some widely spaced lines may be seen, indicating periodicity in growth. Spiral sculpture consists of fine, distinct but low spiral threads, larger ones at intervals: 4, 5, or 6 smaller striæ between the larger; around the umbilicus the striæ are coarser, alternately larger, and latticed by the growth-striæ. Above the penultimate whorl the spirals are subequal. The spire is straightly conic, with 4 whorls below the tongue-shaped apical septum; but an empty whorl or more persists above the septum. The whorls are strongly convex, separated by a smooth, simple and deep suture, which close to the aperture descends a little more rapidly, the last whorl becoming free there for a short distance. The aperture is vertical, slightly longer than wide; the outer side more convex than the inner; reddish-brown inside. Peristome thin, the inner half nearly white, outer half brown-tinted; broadly reflexed throughout, a little retracted above and below, slightly produced in a short lobe above. Operculum unknown.

Length 25, diam. 15.5 mm.; aperture with perist. 12 mm. long.; 4 whorls remaining.

Length 27, diam. 15 mm.; aperture with perist. 12 mm. long., 5 whorls remaining.

Sierra del Ancón, northwest of Viñales, prov. Pinar del Rio, Cuba.

This magnificent species is related to *C. hamlini* var. *major* Crosse (Jour. de Conchyl., 1890, p. 300, pl. v, f. 6 *a*, *b*), but that is a far smaller shell, length about 17 mm., with chestnut-brown streaks extending upon the base. The figure in black and white gives a poor idea of the beautiful coloring of this shell, which is named in honor of my friend, John B. Henderson, Jr.

DESCRIPTIONS OF NEW CUBAN LAND SHELLS.

BY JOHN B. HENDERSON, JR.

HELICINA TORREI n. sp. Pl. 4, figs. 1, 2, 3.

The shell is depressed, very solid, the last whorl cream-white, gradually changing on the penultimate to sulphur-yellow, the color

of the spire. The surface is lusterless, with sculpture of strongly raised, rough spiral ridges parted by much wider concave intervals. On the last whorl there are 18 such ridges, stronger and more widely separated in the peripheral region. The intervals are obliquely roughly striate, and the wider ones above the periphery have also a few spiral threads. Six spiral ridges show on the penultimate whorl. They gradually become weaker on the spire. The embryonic whorl is rather large (2 mm. diam.), and smooth except for faint radial striæ. Whorls 4, rapidly widening, almost flat, the last whorl descends shortly to the aperture, and is convex beneath. Aperture large, flaring, strongly oblique, white with a trace of yellow within. The peristome is well expanded, thickened within some distance from the edge. There is a transverse tubercle at the junction of columella and basal lip. The axial callus is pure white, not very thick, spreading within nearly to the outer termination of the lip. Edge of parietal callus is very thin.

Alt. 15.5, diam. 26.5 mm.

Operculum calcareous, shining, bluish-white with iridescent lights, reddish on margins and densely covered with minute granules separated by species of about equal width.

Collected by T. Wayland Vaughan at Los Negros, 25 miles southeast of Bayamo in the province of Oriente, Cuba, in woods on low limestone hills.

This superb species I take pleasure in naming after Dr. Carlos de la Torre of Havana.

CEPOLIS ALAUDA CYMATIA n. subsp. Pl. 4, fig. 4.

The shell closely resembles *C. alauda avellanea* (Fér.) in texture and coloration, but differs by its more elevated, more conic spire, and by having a strong oblique crest behind the lip. Alt. 24, diam. 28 mm.; whorls $5\frac{1}{2}$.

Cuba; exact locality of the type unknown.

This well-marked variety, not uncommon in collections, appears hitherto to have escaped observation. I have no doubt that in a critical revision of the *Coryda* group this form will be given specific rank.

BIFIDARIA ARMIFERA SAY, AND ITS VARIETIES.

BY V. STERKI.

It has long been known that *B. armifera* is variable with respect to some of its features, but it seems that no attempt has been made to ascertain whether there are any real, tangible varieties. Careful examination of about 2,000 specimens from many places,[1] during the last few months, has proved that, after eliminating *B. clappi* as a distinct species, there are several well-marked varieties, with features which are of interest also in a general way.

B. armifera (Say) typical.[2] Shell more or less fusiform, decidedly short to rather elongate and slender, vitreous, colorless to very pale horn, or slightly milky-white; surface shining, with comparatively coarse, irregular striæ; whorls $6\frac{1}{2}$–8, the average being about 7, the last somewhat rounded, keel-like, at the base, somewhat flattened over the palate, usually with a distinct, linear scar over the lower palatal plica; aperture rather large, rounded, peristome well everted, continuous, or its ends approximate, often with a connecting callus; inside the palate a rather strong, white callus into which the palatal plicæ merge; parieto-angular lamellæ rather large and long, distinctly complex, the angular connecting with the peristome, the spur[3] of the parietal small but distinct; columellar massive, encircling the column, with an annex downward and inward; inferior columellar variable as to size, shape and position, sometimes a mere callus, often wanting; lower palatal plica regular, rather long, stout, upper palatal much shorter and smaller; suprapalatal distinct or slight or wanting; an interpalatal is not infrequent.

Alt. 3.5–5, average 4–4.5, diam. 2.2–2.5 mm.

Distributed over the whole area covered by the species.

B. a. interpres, n. var. Near the typical form, generally somewhat slender; inferior columellar lam. rather high up, the base is narrow inside and more keel-like outside; the aperture is narrowly rounded at the base, and from this feature specimens are easily recognized. More than any other form this shows clearly that the so-called "basal" is really an inferior columellar.

[1] There are 160 entries in my collection of *B. armifera* and varieties, and many others were received for examination.

[2] Dr. Pilsbry had the kindness to look up Say's original specimens in the collection of the Phila. Acad., and wrote me that they are of this form.

[3] See THE NAUTILUS, XXII, p. 108, foot-note.

Distribution: Southern, especially southwestern; it appears to be the prevalent form in Kansas, Arkansas, Oklahoma, and thus represents a geographical variety.

B. a. similis, n. var. Averaging somewhat smaller; more cylindrical, often more or less conical; whorls less convex; surface striæ slighter; shell generally more milky-whitish, as noticed especially when a number of each, *armifera* and *similis*, are placed side by side; peristome never continuous, somewhat less everted; the columellar lam. is slighter, generally more protracted downward, the lower palatal is shorter, sometimes quite short; the spur of the parietal is larger.

Distribution; Northern New York to Iowa, Minnesota, Ontario.

B. a. affinis, n. var. Somewhat small and slight; near *similis*, but less cylindrical, rather somewhat oblong; whorls 6–6½, somewhat more convex than in *similis*, the last rounded at the base and little flattened over the palate, with none or a slight scar over the lower palatal plica; aperture somewhat rounded, peristome never continuous; parieto-angular lam. well connected with the peristome, spur of the parietal larger than in typical *armifera;* columellar nearly axial, a broad lamella, reaching down to the base, with distinct lines of growth, visible from the outside through the (fresh) shell below the umbilicus, as in *B. contracta;* inferior columellar wanting or small; lower palatal quite short, or even a transverse, short, abrupt lamella.

Alt. 3.5–4, diam. 2.2–3 mm.

Distribution: Northern Ohio, Michigan, Indiana to Minnesota and Kansas; seems rather scarce in the first-named States, common in Kansas. Found, *e. g.*, on sandy dunes on Lake Erie in Ohio.

It is notable and significant that both the columellar and the lower palatal in this form are of the same shape as in *B. contracta*, while in typical *armifera* they are quite different, yet the latter shows a tendency to having the peristome continuous, while in *affinis* its ends are always apart.

B. a. abbreviata, n. var. Averaging rather small, slight, somewhat fusiform to ovate or cylindro-conical; apex low, conical or rounded; whorls only 5½–6 (rarely 6½), little convex, with the penultimate comparatively broader than in the other forms, the last rounded at the base, slightly flattened over the palate; color somewhat milky-whitish; surface with a dullish gloss, striæ fine and slight; aperture somewhat small; peristome moderately everted, its ends (in

most forms) comparatively far apart; lamellæ and plicæ: parieto-angular not or slightly connecting with the peristome, spur small; columellar rather as in typical *armifera*, but smaller, slighter; inferior columellar tooth-like, placed obliquely, more constant than in other forms as to size, shape and position; lower palatal regular but slight, often rather short; suprapalatal rather constant.

Alt. 3.3–3.8, rarely 4–4.2, diam. 1.9–2.2 mm.; some specimens are low, almost globular, *e. g.*, alt. 3.2, diam. 2.1 mm.

Numerous specimens seen from Bismarck, N. D.; Eastport, Ia. (Missouri River drift); Lincoln, Neb.; Nickerson, Kans.

As *B. a. ruidosensis*, Prof. T. D. A. Cockerell[1] has denoted a form from New Mexico: "Shell only 4 mm. long, with the two outer teeth a considerable distance within the aperture." The description is somewhat meagre, but the variety may stand on its merits. There are, however, specimens from various places of New Mexico with the lower palatal plica rather short and rather remote from the margin, the columellar rather simple and comparatively small; alt. 3.8–4.2 mm.; they may be of *ruidosensis*.

The interrelations of these forms will be discussed elsewhere, and figures given.

B. armifera appeared to be rather well known, being the largest of the genus, fairly common over a wide territory, and probably the one best represented in collections. Yet a closer study of its forms has shown some interesting facts with respect to morphology, phylogeny and distribution. As Mr. Clapp expressed it, with a view to this variation and the externally similar *B. clappi*: "We can no longer say that a *Bifidaria* is simply *armifera* because it is big and white."

MORE NOTES ON THE FAMILY PYRAMIDELLIDÆ.

BY PAUL BARTSCH, M. S., PH. D.

In the "American Journal of Science" for June, 1909, pp. 475-484, Dr. K. J. Bush reviews my paper on the "Pyramidellidæ of New England and the Adjacent Region," and discusses in a general

[1] THE NAUTILUS, XIII, p. 36. The specimen referred to is not at hand, and I cannot remember exactly what it was. The type is in coll. Acad. Nat. Sciences.

way a number of other papers upon the same group published by Dr. Dall and myself, as well as some of her own and of Prof. Verrill's works upon the family.

In this contribution quite a number of facts are presented, which are at variance with the data at my disposal. I am forced to publish the following notes in order that there may be no misunderstanding.

It is a great pity that Dr. Bush did not publish the manuscript she prepared in 1896. As it is, the MS. names have no standing and cannot enter into the discussion of the present work.

I was not aware that Dr. Bush was working upon this group at the time I prepared my manuscript, her last publication upon it having appeared nine years ago, nor was I aware that Dr. Bush had seen Mr. Winkley's material, which was incorporated in my report, as was implied in her review. I wish likewise to disclaim any intended discourtesy in not acknowledging Dr. Bush's work in my introduction, for I considered both of her papers as extralimital. The one dealt with Carolinian, Floridian, West Indian and South American species (with a reference to *Turbonilla interrupta* Totten); the other with Bermudan forms.

The matter of classification is so fully discussed in the monograph on the West American Pyramidellidæ by Dr. Dall and myself now going through the press, that I shall not refer to any of the statements concerning it here, but will refer any one interested in the subject to the forthcoming volume. I will say, however, that *Pyrgostelis* (which has no standing) was never used by us, Dr. Bush notwithstanding, and that *Triptychus* and *Peristichia* are Pyramidellid; they have a sinistral nucleus and columellar folds, the family characters of the group. Here also I may say that Dr. Bush is in error when she states that Dr. Dall and myself furnished the text on the mollusks in Dr. Arnold's paper on the Paleontology and Stratigraphy of the marine Pliocene and Pleistocene of California: Mem. Cala. Acad., III, 1903. We contributed only that part which deals with the Pyramidellidæ.

I believe that all of the present differences of opinion could have been avoided if Dr. Verrill had yielded to my request and had sent me specimens of what he considered typical representatives of some of the older species as well as some of those described by himself. All of the early collections of northeastern American marine

invertebrates were placed in Professor Verrill's charge by the U. S. Bureau of Fisheries for report, and have been in his care until very recently, when most of them were returned to the custody of the U. S. National Museum. It would seem only natural that I should have had specimens for comparison ; first, because they represented government material *reported upon*, and, secondly, because when Miss Bush was at work upon her southern report, Dr. Dall furnished her with cotypes and authentic material as requested, and as duly acknowledged in her report.

I neither had nor have any desire to enter into a controversy with any one concerning these old species, the original descriptions of which in some instances are so poor that it is scarcely possible to refer them to the proper subgenus, and which in most cases might be applied to almost any member of a subgenus. No types are extant, some having been burned in the Chicago and Portland fires and others lost.

There is only one of two ways open in dealing with such names, viz., to place them as "sedes incertae," or to fix them to some known species. The latter method was adopted by Prof. Verrill, and I attempted as far as it was in my power to follow his dictum, the only logical method under the circumstances.

The subgenus *Eulimella* will have to be dropped from our New England list, now that Dr. Bush has been able to show that the two specimens identified by Prof. Verrill as *Eulimella ventricosa* Forbes, are *Turbonilla* (*Ptycheulimella*) *polita* (Verrill) and *Aclis tenuis* Verrill. I have seen no specimens of *Eulimella* from New England, and quoted it on Dr. Verrill's authority as stated.

Pyramidella (*Syrnola*) *smithii* Verrill has only a single fold on the columella, hence is a *Syrnola ;* not a *Eulimella*, which has two folds.

I have seen C. B. Adams' types at Amherst College, and feel no need of changing my statement regarding *Pyramidella* (*Syrnola*) *fusca* and *producta*. I agree with Dr. Bush that they are not typical *Syrnolas :* that is why I placed the ? after *Syrnola*. It is quite probable that these two species and *S.? winkleyi* may belong to a new group, but I have refrained from giving it a name until some knowledge of the animal might be obtained. These are by no means *Odostomias*, but are nearest to if not exactly congeneric with *Syrnola*.

My *Turbonilla* (*Turbonilla*) *nivea* Stimpson, was an acceptance of Professor Verrill's interpretation of that species. The specimen listed

as cat. no. 45481 U. S. N. M., from station 949, off Martha's Vinyard, 1881, was determined by him, and the others which I listed, were carefully compared with it and was found absolutely conspecific.

As to *Turbonilla* (*Turbonilla*) *striata* Verrill, I must again say that I followed Prof. Verrill's dictum; the 15 specimens listed as cat. no. 62340 U. S. N. M., from Naushon gutters, 1883, were determined by him, like the 11 entered under cat. no. 203815 U. S. N. M., from Naushon, 1883, the two last being part of the material recently returned, and the other two lots listed are absolutely conspecific with these. I am therefore at a loss to understand how I could possibly have erred in the interpretation of the species.

I have no additional data concerning *Turbonilla* (*Chemnitzia*) *æqualis* Say.

Turbonilla (*Strioturbonilla*) *bushiana* Verrill, will have to remain in this subgenus. It falls well within Sacco's definition: "Testa sicut in TURBONILLA (stricto sensu), sed transversim striolæ parvillimæ (sub lente vix visibiles) plerumque tantum in spatiis intercostalibus, interdum etiam supra costas decurrentes saepe suboblitæ. Costæ longitudinales basim versus gradatim evanescentes. Costicilla circumbasalis nulla. Testæ basis subrotunda."

Page 481. I shall reserve my judgment regarding *Turbonilla* (*Pyrgiscus*) *areolata* Verrill, until I have had the opportunity to make comparisons with the type. I may say, however, that the affinity of our specimens are not with *Turbonilla* (*Pyrgiscus*) *vinæ*, as suggested by Dr. Bush, but with *Turbonilla* (*Pyrgiscus*) *elegans* Verrill.

The most interesting part of the whole review comes under the head "*Turbonilla interrupta* (Totten) Bush, 1899, pp. 148–151."

Of this species Dr. Bush gives her own interpretation, and emphasises her opinion with a figure of what she considers the true "*interrupta* Totten"—stating that "the specimen described (p. 87), and figured by Bartsch, unfortunately does not agree with this, therefore I would distinguish it as *Turbonilla pseudointerrupta*, new name."

There is only one fault with Dr. Bush's deductions, namely, that our figure and description were based upon the same individual which has served for her figure of typical *interrupta*. The figured specimen from Sta. 770, Narragansett Bay, in 8 fms., dredged in 1880, is now entered under cat. no. 202889 U. S. N. M. It came to us in

1907, when a large part of the Bureau of Fisheries collection in Dr. Verrill's charge was turned over to the U. S. National Museum, and bears the legend, "Sta. 770, Figured, *T. interrupta* Totten," in Dr. Bush's handwriting. The name *Turbonilla pseudointerrupta* Bush, is therefore superfluous.

Dr. Bush states that *Odostomia bushiana* Bartsch, is preoccupied by *Odostomia bushiana* Jeffreys, 1884. I have been unable to find any such name. The only reference to *bushiana* by Jeffries in 1884, that I know, is to *Turbonilla bushiana* Verrill.

I am not in position to give any opinion upon what Dr. Bush's young shell from Woods Holl may be, but I do know that our shell is an *Odostomia* belonging to the subgenus *Iolæa*. *Iolæa*, like *Menestho*, from which it is distinguished by having an umbilicus, is quite variable in its strength of sculpture. *Odostomia* (*Iolæa*) *hendersoni* Bartsch, is neither the *type species* nor the norm, of *Iolæa*, but comes well within its definition. It does not belong to the same family to which *Aclis* belongs.

A single specimen of *Phasianella sulcosa* Mighels, was found by Mighels in Casco Bay. It was described in 1843, Bost. Journ. Nat. Hist., IV, p. 358, Pl. XVI, f. 4, and later doubtfully referred to *Rissoella* by Stimpson. It is quite probable that it really belongs to *Menestho*, the subgenus of *Odostomia*, which it resembles in sculpture, but no plication is shown or mentioned on the columella, and nothing is said of the nucleus. The lack of positive data concerning these characters kept me from referring it to the Pyramidellidæ.

I would be pleased to know upon what grounds Dr. Bush bases her contention of the synonymy of *Phasianella sulcosa* Mighels, and *Odostomia* (*Menestho*) *sulcata* Verrill; for Mighels' description and figure are entirely different from Professor Verrill's description, and Dr. Bush's figure of *Odostomia* (*Menestho*) *sulcata* Verrill.

Phasianella sulcosa Mighels, is represented much more inflated than *Odostomia* (*Menestho*) *sulcata* Verrill. *P. sulcosa* Mighels, has three incised spiral grooves between the sutures on each whorl, and three or four on the base, while *Odostomia* (*Menestho*) *sulcata* Verrill is represented as having five spiral grooves between the sutures and nine upon the base. A glance at the two figures alone is enough to convince one that they are not at all specifically related, and this deduction is verified by the description. I do not believe that the author of the latter species would agree to have his species put under

the synonymy of Mighels' *Phasianella sulcosa*. Under these circumstances, *Odostomia* (*Menestho*) *morseana* will have to do duty as stated in my text, p. 104.

I object emphatically to the lumping of *Odostomia bisuturalis* Say and *O. trifida* Totten. In the 1700 and more specimens that I have seen, I have no difficulty whatever in distinguishing them. It is true that *trifida* sometimes has the three suprasutural grooves poorly developed, but I have never seen them completely absent, as is the case with *bisuturalis*.

I also deny that there is any special relationship between *Odostomia* (*Menestho*) *bedequensis* and *Odostomia* (*Menestho*) *impressa* Say. The relationship of *Odostomia* (*Menestho*) *trifida* and *Odostomia* (*Menestho*) *trifida bedequensis* I believe is parallel to that between O. (*M.*) *bisuturalis* and *O.* (*M.*) *bisuturalis ovilensis*.

Dr. Bush questions whether I intended to use the word "spiral" in the fourth line of my description of *Odostomia* (*Menestho*) *impressa* Say. I did. "Spiral" is correct.

The specimen described and figured by me as *Odostomia* (*Odostomia*) *modesta* Stimpson, will have to be cited as *Odostomia* (*Odostomia*) *gibbosa* Bush.

Dr. Bush states (p. 482, last paragraph), "that the shell which is referred to *Odostomia* (*Odostomia*) *dealbata* Stimpson," is not the same as fig. 595, given in Binney–Gould, p. 327;" of the latter she says: "This, as indicated in a marginal note, represents a much larger and different species, which may be called *O. gouldii*, new name." Unfortunately, the name *Odostomia gouldii* was used by Dr. Carpenter in 1865, Ann. Mag. Nat. Hist., 3rd ser., XV., p. 30, for a West American species, and can therefore not serve in the present instance.

Summing up Dr. Bush's review I must say that nearly all the questions raised in it could have been settled better by correspondence than by discussion in print. It is somewhat unfortunate that Dr. Bush should not have published her paper written thirteen years ago, but I cannot see how this can now be helped. I have given all my spare time to this group since 1897, and hope, now that the West Coast is cleared up, to consider the Atlantic side of America.

The field is much larger than any one, who has given it less attention, would imagine. My card catalogue of described forms contains somewhere between 2,500 and 3,000 names, including recent and fossil species.

NOTES.

VIVIPARUS IN PHILADELPHIA.—A find which may be of interest to readers of the NAUTILUS was made by the undersigned a few weeks ago near Horticultural Hall in Fairmount Park. The species was *Viviparus contectus* (Mill.). It has not before been reported from Philadelphia, and as far as I know not from the State. The females were larger than the males and outnumbered them. Most of the adult females were pregnant. The sex was determined in 14 males and 39 females. In 18 specimens it could not be determined readily. The specimens are in my own collection and that of the Academy of Natural Sciences. The lily pond in which they were collected had just been restocked with plants, and Mr. Pilsbry, to whom I owe the identification, suggested that the snails had been introduced on the plants. Two years ago they were unknown in the same pond.—JOSHUA T. BAILY, JR.

We have to announce the death, July 28th, at Los Angeles, Cal., of Dr. R. E. C. Stearns, in his 82d year. Also, of Mr. William G. Binney, on July 25th, at his home, 222 East Union St., Burlington, N. J.

PUBLICATIONS RECEIVED.

A PRELIMINARY LIST OF THE UNIONIDÆ OF WESTERN PENNSYLVANIA, WITH NEW LOCALITIES FOR SPECIES FROM EASTERN PENNSYLVANIA. By DR. A. E. ORTMANN (Annals of the Carnegie Museum, Vol. V, pp. 178–210, 1909). An interesting review on the geographical distribution of the *Unionidæ* in Pennsylvania. Some 46 species are recorded from the Ohio River drainage, 17 from the Lake Erie drainage, and 14 from the Atlantic drainage.

THE DESTRUCTION OF THE FRESH-WATER FAUNA IN WESTERN PENNSYLVANIA. By DR. A. E. ORTMANN (Proc. Amer. Phil. Soc., Vol. 48, pp. 90–110, 1909). A paper of general interest to all zoologists, showing clearly with the aid of a map the great changes which have taken place in comparatively few years. Situated in the great oil and coal region, this section has suffered more than areas where the streams are only polluted by the sewage of the large towns and cities.

SHELLS OF MAINE, A CATALOGUE OF THE LAND, FRESH-WATER AND MARINE SHELLS OF MAINE. By NORMAN WALLACE LERMOND. An up-to-date list of the shells of Maine, containing 403 species and 38 varieties, with the principal synonymy and their distribution. The introduction contains a review of the work done by previous authors and others. Privately printed by the author at Thomaston, Maine.

THE NAUTILUS.

VOL. XXIII. OCTOBER, 1909. No. 5

A NEW BELA FROM FRENCHMAN'S BAY, MAINE.

BY KATHARINE J. BUSH, PH. D.

BELA BLANEYI, sp. nov. Fig. 1.

Type locality—South of Egg Rock buoy in about 30 fathoms mud and gravel, Frenchman's Bay, Maine.

Two dead specimens dredged by Mr. Blaney were recently sent me for identification. They are of especial interest as they prove to be unlike any species hitherto known from the American waters. The only one which they at all resemble is the *Bela incisula* Verrill (Transactions of the Connecticut Academy of Arts and Sciences, vol. V, p. 461, pl. xliii, fig. 12 and pl. lvii, fig. 14, 1882).

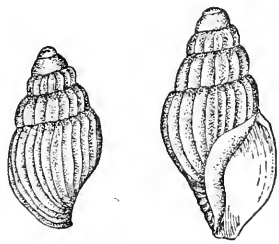


FIG. 1. BELA BLANEYI.

They differ from that species in having more elongated whorls and therefore appear more slender. The ribs are very little raised and are indicated rather by the deepened interspaces than by being raised above the general surface level along the shoulder which is roundly angulated; on some portions of the whorls these ribs blend entirely

with the sinuous lines of growth. The smaller specimen of four (4) whorls is destitute of spiral lines, either raised or incised, but the larger one of five (5) whorls has about fifteen (15) very faint incised spiral lines on the body whorl commencing well below the shoulder and are so shallow as to scarcely interrupt the otherwise smooth surface; there are also occasional faint indications of one or two spirals just above the suture on the preceding whorl. The one and one-half (1.5) nuclear whorls are well rounded and apparently smooth (this may be due to erosion) and regularly coiled. The epidermal layer has a delicate yellow tint.

The larger specimen measures 7 mm. in length by 3.5 mm. in width. The smaller, 5.5 mm. in length by 3 mm. in width.

I take much pleasure in naming the species in the honor of Mr. and Mrs. Dwight Blaney, of Boston, Mass., and Ironbound Island, Maine who have long been enthusiastic collectors and students of New England mollusks and have added much to our knowledge of the fauna.

Yale University, September, 1909.

LIST OF SHELLS FROM FRENCHMAN'S BAY, MAINE.

BY DWIGHT BLANEY.

The following list of additions to the shell-bearing Mollusks of Frenchman's Bay, is supplementary to the lists published in 1904 and 1906. (Proc. Bost. Soc. Nat. Hist., Vol. 32, No. 2, pp. 23–41, and NAUTILUS, Vol. XIX, No. 10, p. 110). The writer is indebted to Dr. K. J. Bush and Mr. C. W. Johnson for the identification of the various species.

Leda caudata, Lovén. One fine specimen.

Odostomia sulcosa (Mighels)= O. sulcata Verrill. (See K. J. Bush, Am. Journal Sci., Vol. XXVII, p. 475, 1909.)

We have dredged 20 specimens of this interesting species, the largest being 4 mm. long. Some with the distinct upturned nucleus most perfect.

Odostomia dealbata (Stimp.) Six specimens.

Bela decussata var. *pusilla* Verrill. (Trans. Conn. Acad. Vol. V, 1882, p. 481). A fine series dredged off Egg Rock.

NOTE.—Among our large series of *B. incisula V.*, we have found

considerable variation in the longitudinal sculpture, and have been able to arrange good series of a form *without any* longitudinal ribs, which seems worthy of being a good variety; we have also arranged a good series of an intermediate form showing numerous ribs which grade into the typical form as described and figured by Prof. Verrill. (Trans. Conn. Acad., Vol. V, p. 461, pl. xliii, fig. 12.) We have good examples of the very young of all three forms, showing the subnucular whorls forming the characteristic sculpture.

Bela blaneyi Bush. Two specimens, one immature and one adult, (see previous article).

Philine lima (Brown) = *P. lineolata* Stimp. Two specimens dredged off Egg Rock, one alive.

Retusa obtusa Montg. var. *turrita* Möller. Six specimens.

NOTE.—We have been able this season to dredge fine specimens, both valves, of *Pecten islandicus* (Müller.), *Serripes grœnlandicus* (Gmelin), *Panomya norvegica* (Spengler), *Cyrtodaria siliqua* (Chem.), and *Cochlodesma leanum* (Conrad). Of all of which we had previously dredged only single valves.

A NEW LAND SHELL FROM BERMUDA.

BY H. A. PILSBRY AND E. G. VANATTA.

ZONITOIDES BERMUDENSIS n. sp. Fig. 1a, b, c, d.

The shell is broadly umbilicate, much depressed, with low convex spire and rounded periphery, glossy, yellow. First $1\frac{1}{2}$ whorls corneous, smooth, the rest distinctly, rather irregularly striate, the base a little smoother. Under the compound microscope very faint traces of minute spiral striæ may be seen, chiefly on the upper surface. Whorls $5\frac{1}{4}$, convex, slowly increasing, the last less convex below than in the peripheral region; the umbilicus perspective, broadly open, one-third the total diameter of the shell. Aperture lunate, wider than high, but not much wider than the umbilicus.

Alt. 2.3, diam. 5.7 mm.; width of umbilicus 1.8, aperture 2 mm.

Church Cave, near Tuckers' Town, Bermuda. Types no. 91,152, A. N. S. P., collected by Mr. Stewardson Brown, 1905 and 1909.

This species has more whorls and a smaller apex than *Z. excavata* (Bean), it is more depressed, the last whorl is less convex beneath, and the umbilicus is larger. *Z. arborea* (Say) has invariably a

much smaller umbilicus than the Bermudian species, which is more depressed than *Z. nitida*, with a more open and perspective umbilicus.

This shell is abundant at the place mentioned, where it is associated with numerous other land shells, most of them native species. We have been unable to find any foreign species to which this may be referred. It seems to be indigenous. The generic reference has been verified by examination of the dentition, which has teeth of the type usual in *Zonitoides*. There are 6 lateral and about 17 marginal teeth (fig. 1*d*). The jaw is smooth, with a low median projection (fig. 1*c*). We found no dart in the two dried specimens examined, but this may have been due to their condition.

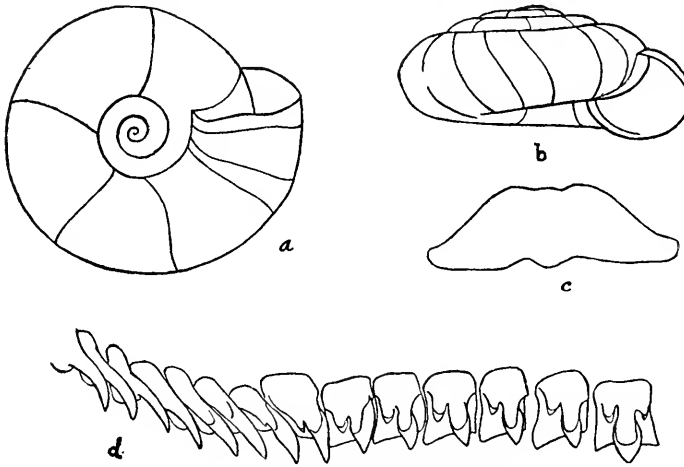


FIG. 1. *Zonitoides bermudensis.*

KALIELLA TURBINATA (Gulick).

Euconulus turbinatus Gulick, Proc. A. N. S. Phila., 1904, p. 420, pl. 36, figs. 8, 9, 10.

This species is abundant at Church Cave. An examination of the radula shows it to be a typical *Kaliella*. It resembles the Indian *K. fastigiata* (Hutton), but is distinct from that and all other known Indian species, according to Lieut.-Col. Godwin Austen, who kindly compared specimens with his great series of oriental species.

K. turbinata was described from sub-fossil examples from the lime-rock quarries. It is therefore not a recent importation; yet the presence of this oriental genus in Bermuda can hardly be accounted for except by the supposition of introduction with plants during the period of human occupation.

A NEW RISSOA FROM BERMUDA.

BY E. G. VANATTA.

RISSOA (NODULUS) STEWARDSONI, n. sp. Fig 1.

The shell is very minute, slightly rimate, thin, pale yellowish corneous, smooth, slender, regularly tapering from the last whorl to the very obtuse summit. Whorls $4\frac{1}{2}$, moderately convex. Aperture semi-rotund, subvertical, the peristome continuous, inner margin nearly straight, the outer regularly curved. Length 1.5, diam. 6.5, length aperture .55 mm.

Types No. 99041, A. N. S. P., from Fairyland, near Hamilton, Bermuda, near the shore, collected by Mr. Stewardson Brown, associated with *Melampus coffea* and *flavus*, *Leuconia occidentalis* Pfr., *Blauneria*, *Alexia*, *Detracia*, *Pedipes*, *Carychium*, *Cæcilioides*, *Bifidaria*, *Thysanophora*, *Polygyra microdonta*, and many other land shells.

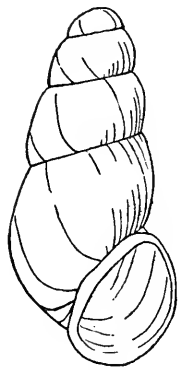


FIG. 1.

FIG. 2.

This tiny snail has the appearance of the terrestrial genus *Acme*. It is apparently a shore shell, as it was not found with any typically marine forms. It seems to be most closely related to the Mediteranean and Adriatic *R. epidaurica* Brusina, from which it differs by the more slender contour, more tapering spire and more convex whorls. *R. epidaurica* is decidedly more cylindrical. For comparison a figure is given (fig. 2) of a specimen of *R. epidaurica* received from Professor Brusina, from Ragusa, Dalmatia (No. 59,-898 A. N. S. P.) *R. glabrata* Muhlf. is more conical than *stewardsoni*, with the aperture more rounded.

DESCRIPTIONS OF TWO NEW SPECIES OF MUSCULIUM.

BY V. STERKI.

MUSCULIUM WINKLEYI, n. sp.

Mussel slightly inequipartite, high, well and regularly inflated, outlines along the valve edges well rounded to subcircular; posterior part higher and somewhat larger than the anterior, often subtruncate and with a slight postero-inferior angle; beaks little anterior, rather narrow, calyculate or plain, prominent; somewhat inclined towards the anterior; surface distinctly rugulose, dullish or somewhat shining, with comparatively coarse, sharp, subregular, crowded concentric striæ and some faint, shallow, irregular radial striæ; color horn to grayish or reddish, with one to a few narrow, darker zones along the lines of growth, straw to light yellowish in the young, and in marginal zones becoming obsolete in old specimens; shell thin, subtranslucent to opaque, hinge well curved, slight, cardinal teeth small, thin, laterals with short cusps; ligament rather short, covered; scutum and scutellum slightly but distinctly marked, rather long.

Long. 8.5, alt. 7.8, diam. 5.4 mm.

Soft parts not examined.

Habitat: Old Orchard, Me.; vicinity of Danvers, Mass.

M. winkleyi is not a variety or local form of some other species, but markedly different and decidedly distinct. It has some resemblance to forms of *M. securis* Pr., but is higher, with more rounded outlines, the hinge margin is more curved, the difference of size and shape between the anterior and posterior parts is less marked; in *securis* the posterior part is more truncate and less obliquely so to the dorso-ventral line. All these differences are especially well marked in half-grown specimens.

It is somewhat variable: some specimens seen (years ago) from Old Orchard were 10 and 10.5 mm. long; those seen from Danvers are somewhat smaller and slighter, with slighter surface striæ, some of them of a little more angular outlines posteriorly.

The type lot is No. 1396 of my collection of *Sphæriidæ*,[1] from Old Orchard, Me.,[2] collected and sent in 1896 by the Rev. H. W. Wink-

[1] Now of the Carnegie Museum.

[2] There is no doubt that specimens from the same place are in various other collections as *M. securis cardissum* or as "?."

ley, in whose honor the species is named, and who has collected specimens of all stages of growth at various places in the vicinity of Danvers (Nos. 5343, 5355, 5356).

MUSCULIUM PARVUM, n. sp.

Shell small, inequipartite, oblique, medium inflated; margins generally rounded, or with a slightly marked angle at the junction of the superior margin with the obliquely subtruncate posterior; anterior part of the mussel much smaller than the posterior; beak somewhat anterior, little prominent, broad, calyculate or plain (form æstivalis); surface shining, with slight, irregular striæ; shell very thin and fragile, transparent to translucent, colorless to pale corneous; hinge very slight, cardinal teeth nearly straight longitudinally, the left posterior above the anterior, which is strongly curved up.

Soft parts colorless (except for the tan of the liver), also the siphons and mantle edges; siphons short, very shortly connected when extended, the branchial wide; foot strongly folded at the sole, when emerging.[1]

Long. 4.7, alt. 4, diam. 2.8 mill. (average).

Habitat: Ohio; a swamp near Uhrichsville; also in Stark and Summit Counties, collected by the writer, 1906–'09. Types no. 5408 of my collection of Sphæriidæ.

The first specimens were doubtfully ranged under *M. securis* Pr.; but with the latest ones, and their soft parts, it became evident that they are distinct; they are smaller, the superior margin is less curved, the posterior is more rounded and more oblique, the surface shining, the shell colorless, while in *securis* it is generally yellow; the siphons are much shorter and very shortly connected, colorless; in *securis* they are yellow to orange or salmon or reddish.—*M. sphæricum* Anth., so far as known,[2] is larger, the beaks are narrow and much more prominent.

[1] This may not be a specific feature.

[2] The two specimens (four loose valves, the third in the lot is a young *Sphærium occidentale* Pr.), in the T. Prime collection, No. 10 (conf. 1895 catalogue) and ranged under *securis*, are hardly sufficient for establishing a species; the one in the National Museum, No. 11612, is rather different; in the Anthony collection no specimens were found.

ON COLLECTING.

BY REV. HENRY W. WINKLEY.

"I wish I had my life to live over again" is a frequent expression. The writer has no such desire, but I could have done better work formerly if I had had the experience, and I wish I could give my experience to others.

Dr. Sterki has in a recent article in the NAUTILUS, mentioned some methods of work. A visit from that veteran worker a few months ago was of great help to me. As a result I have collected more materials this year than I have in any half-dozen years formerly. My outfit is simple. Rubber boots, a net of scrim, frame of steel wire so made that there is one foot straight as a scaping surface, a bamboo pole in two joints. A large sieve of fine grain, small bags of kakki and one or two jars. All can be carried on a bicycle. With this outfit I have gone from my home on trips lasting from one to two hours, and returned with from one to two thousand specimens of Pisidium, Planorbis, Amnicola, etc. The same outfit serves for much of the marine work. The importance of "when you're gittin, git" is realized when one returns with one or two thousand specimens and finds two or three very rare forms among them. Mud is my delight in fresh or salt water. It is swarming with life. Eel grass is another rich field. Dip and sift dry and examine with a lens; the tiny chaps are easily overlooked.

Our work is a labor of love, many of our best collectors have limited means, often limited time. Though the writer has at times employed a sail boat for dredging, and results have been excellent, all the new species turned up in New England during the last twenty years, have been obtained either by trips on foot or from a row boat. It requires hard work to dredge from a row boat, but it can be done. Rare species of Pyramidellidae have all been obtained in that way, but don't be afraid of mud. A list of Prince Edwards Island species, some new—others not before known in Canadian waters has proved a valuable contribution. I never was anywhere near that island. The materials all came from mud washed from the oyster shells, miles away from their home. At present the writer is busy with marine mud in a sheltered bay. Reports will come later, but rare forms with one species that may prove new, are already before me. New England needs more workers, and it is full of surprises, espe-

cially when one considers how much can be found with a simple outfit, and a few ounces of energy. No doubt the same is true of the whole country. A person once said to the writer "your hobby is the most fascinating I know. Every one admires shells." Perfectly true, but far too many are afraid of mud. I don't know of any success without a bit of the disagreeable work.

THE LAND MOLLUSCA OF ALDABRA.

BY MAXWELL SMITH.

Mr. E. Dupont, who is now residing at Hell Bourg, Reunion, has been fortunate in obtaining specimens and information of this group. The Aldabra Islands are situated in the Indian Ocean to the north of Madagascar and between the Conoro and Mascarene groups. Not many years ago the land mollusca of Aldabra were unknown, in fact not a single species had been recorded from the islands. Mr. Dupont writes me as follows. Aldabra was visited by an American, Dr. W. L. Abbott, in 1892, who published an account of the birds in the Proceedings of the U. S. National Museum for 1895.

The island was visited by a German, Dr. Vodtykon in 1895, accounts of which were published. I do not think that these mention land shells. In September, 1906 my cousin, Mr. R. Dupont, Curator of the Botanical Station at Victoria, Mahe, Seychelles, investigated these islands on behalf of the Seychelles government. He collected the shells which I now send to you.

At last, quite recently an English naturalist, Mr. Fryers, has been staying there during several months; to complete the geological observations made by Prof. Sardina, on the separation of the islands in the Indian Ocean.

So now the natural productions of this island, which was for long a terra incognita, will now be fairly known. Judging from the shells, it has more affinities with the Comoro Islands than with the Mascarene.

The shells known are as follows:

Ennea sp. Grande Terre. The Picard. Iles Vertes. Closely allied to the common *E. dentiens.* May prove to be new.

Kaliella aldabraensis, n. sp. To be described by Col. Godwin Austin.

Rachis aldabræ Mart. A beautiful shell of the Comoro type. The most common of all the species from Aldabra. Mostly found on Picard Island. 200 metres from the sea.

Succinea mascarensis? Nevill. Larger and more strongly striated than the Mascarene specimens.

Assiminea sp. Perhaps *A. hidalgoi* Gass.= *granum* Morelet. Grande Terre. The Picard. Iles Vertes.

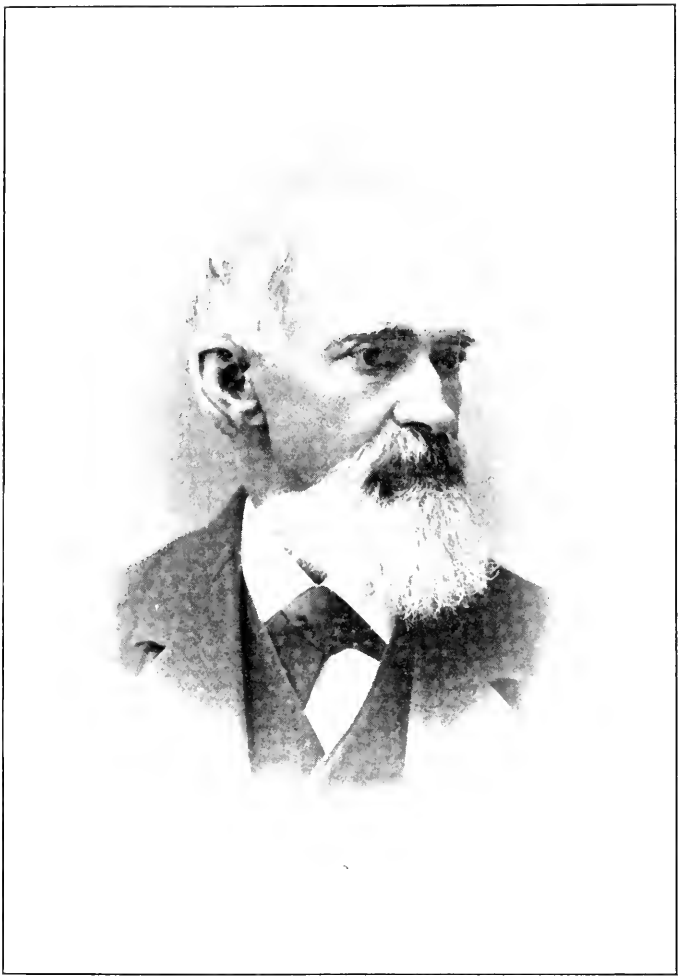
Cyclostoma sp. Plaine Cubi. A *Ligatella* or *Otopoma*. It seems to be a new species, but too much worn for description. Better specimens came in Sardina's collection.

Truncatella valida Pfr. Grande Terre. The Picard. Iles Vertes,

Isidora sp. Perhaps *I. forskali* Chr. = *Physa cernica* Morelet. from Mauritius. The presence of this fresh-water shell at Aldabra is very curious, the only spot provided with fresh water being a spring at Tata maca.

DR. R. E. C. STEARNS.

Dr. Robert Edwards Carter Stearns died at Los Angeles, Cal., July 27, in his eighty-third year. He was a native of Boston, Mass., a son of Charles Stearns, and was born February 1, 1827. He was educated in the schools of his native city, followed by a course of mercantile training, and from his earliest years evinced a deep love of nature, fostered by his father, with whom similar tastes led to a degree of comradeship in rambles and hunting expeditions which he always remembered with appreciation. The boy had an unusual artistic ability, and though his early avocations were services in a bank and on a farm, when only twenty-two years of age he painted a panorama of the Hudson River from the mouth of the Mohawk to Fort William, which he exhibited with much success. He turned his attention to mining, explored the coal fields of southern Indiana, and in 1854 was appointed resident agent of several copper mines in northern Michigan on Lake Superior. In 1858 he went to California, where he became a partner in the large printing establishment of a brother-in-law of his wife, in San Francisco. This firm published the *Pacific Methodist*, a weekly religious paper, and in the troubled times preceding the Civil War the reverend editor of this journal was obliged to visit the East. Stearns was requested to fill this place during his absence. The fate of California hung in the balance; many of the immigrants from the Southern States urged



DR. R. E. C. STEARNS

independence for that territory when hostilities broke out. Stearns took the responsibility of making his paper an enthusiastic advocate of the Union cause, and to this call and the eloquence of Thomas Starr King, old Californians believed, the decision of the people to stand by the Union in that struggle was due in no small degree. Through the influence of Justice Field, Stearns was appointed deputy clerk of the Supreme Court of California in 1862, a post which he resigned in the following year to accept the secretaryship of the State Board of Harbor Commissioners, which he was obliged to resign some years later on account of ill health. Coming to the East, he made one of a party, comprising beside himself the late Dr. William Stimpson and Col. Ezekiel Jewett, for the exploration of the invertebrate fauna of southwestern Florida, during which large collections were made for the Smithsonian Institution. He returned to California, and in 1874 was elected secretary to the University of California, being the business executive of that institution under the presidency of the late Dr. Daniel C. Gilman. He served in this capacity for eight years with great approval, and when ill health again obliged him to retire from service, the University, as expressive of their sense of his services to the cause of education in California and in recognition of his scientific attainments, conferred upon him the degree of Doctor of Philosophy. Returning to the East after the death of Mrs. Stearns, he was engaged in researches for the U. S. Fish Commission in 1882, was appointed paleontologist to the U. S. Geological Survey by Major Powell in 1884, and assistant curator of mollusks in the National Museum by Professor Baird. His collection of mollusca was acquired by the Museum. Age and infirmity obliged him to return to the more genial climate of California in 1892, where he settled in Los Angeles, continuing, as his strength permitted, his researches into the malacology of the Pacific coast. He married, March 28, 1850, Mary Anne Libby, daughter of Oliver Libby of Boston, and is survived by a daughter.

Dr. Stearns was an earnest student of mollusks from boyhood; his early experience led him to interest himself in horticulture and landscape gardening, and his ability in this line is attested by the beauty of the University grounds at Berkeley, which were developed under his superintendence. His knowledge of the Pacific coast mollusca was profound, and a long list of papers on this topic and on the shells of Florida was the result. He also contributed many papers

on various branches of horticulture and gardening to the California periodicals devoted to this subject. He was an enthusiastic supporter of the California Academy of Sciences in its early days, and after the earthquake of 1868, when disaster threatened the Society, he, with Professor J. D. Whitney and a few other friends, stood between it and dissolution. He was a member of numerous scientific societies at home and abroad, and of the Sons of the Revolution.

Dr. Stearns was a man of sanguine temperament, with a lively sense of humor and high moral character. His reading was wide, his learning never obtrusive, his interest in art, literature and all good causes intense. He was a staunch friend and, for a righteous object, ever ready to sacrifice his own material interests. His services to Californian science will keep his memory green.

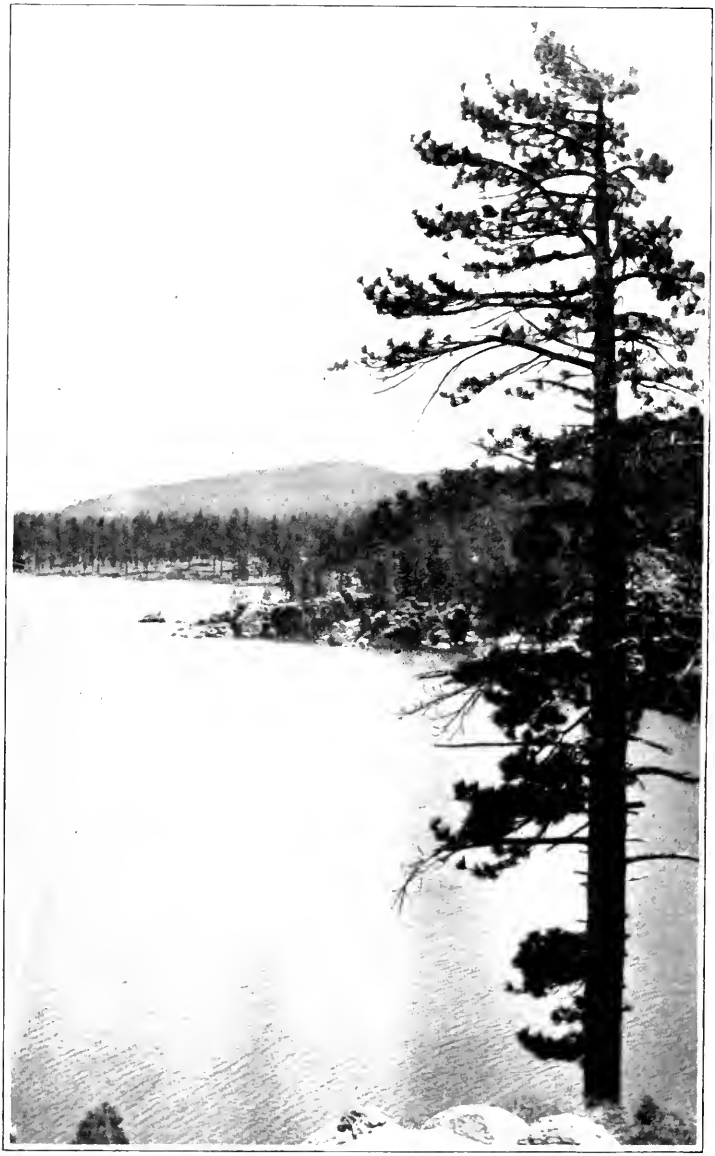
Wm. H. Dall.

LUDWIG RUDOLPH SOPHUS BERGH.[1]

Dr. Bergh was born in Copenhagen, October 15, 1824, and died in the same city July 20, 1909. Dr. Bergh for many years stood at the head of the small group of malacological anatomists, devoting himself especially to the Opisthobranchiata and particularly to the Nudibranchiata. His published works on these animals form a small library and a mine of detailed information. The chief results of this unremitting labor are summed up in a large quarto in which he gives a complete systematic arrangement for these animals. Besides this contribution to the knowledge of molluscan anatomy he published several valuable memoirs on other groups of mollusks, an especially notable instance being a fine memoir on the anatomy of the genus *Conus*. He was largely concerned with the publication of the great posthumous series of quartos detailing the results of the researches in eastern seas by Carl Semper, who was his intimate friend. In medicine also his publications, based on the treatment of thousands of hospital patients, took a high rank.

Personally, Dr. Bergh was most genial and agreeable in manner, ever ready to help younger students, or serve as cicerone to foreign colleagues visiting his beloved Copenhagen. Hospitable and unpretentious, a staunch friend and untiring student, his death leaves a gap in the ranks of the veterans which we may hardly hope to see filled, and a memory which those who knew him will cherish long.

[1] Abridged from the obituary notice by Dr. Wm. H. Dall (Science, XXX, p. 304, Sept. 3, 1909).



BEAR LAKE, CALIFORNIA.

THE NAUTILUS.

VOL. XXIII. NOVEMBER, 1909. No. 6

THE KNOWN MOLLUSCA OF SAN BERNARDINO COUNTY, CALIFORNIA.

BY S. S. BERRY.

In light of the fact that accurate data bearing on the geographical distribution of Californian land and fresh-water mollusca are still few and far between, it seems best to publish such items as may be accumulated from time to time, and in this connection the following notes (the result of several years desultory observation) may be of interest.

The district under present consideration comprises one of the largest, if not the largest, counties in the United States, being more than equal in area to any one of a number of our smaller States. By far the greater portion of its area is swallowed up by the vast Mojave and Colorado Deserts, and even at this late date is still almost an absolute terra incognita so far as the mollusca are concerned. Of necessity, therefore, the present paper treats almost exclusively of the extreme southwestern corner of the county alone, namely, the so-called San Bernardino Valley, with the adjacent San Gabriel and San Bernardino Ranges of mountains which confine it on the north and shut it off from the desert and the remainder of the county. Even for this circumscribed district, the present list makes no pretensions to completeness, but is offered merely as a résumé of our present knowledge, with the hope that it may lead to further investigation. Doubtless more than one interesting form still awaits its discovery by some diligent collector, especially in the mountain regions (see NAUTILUS XXI, p. 121, and below).

It is interesting to note that the above-mentioned valley is practi-

cally the only portion of the entire county which drains directly into the Pacific, and that, thanks to the fertile character of its soil and the water available for its irrigation from the neighboring mountains, almost the whole population of the county is concentrated here, notably in the cities of Redlands, San Bernardino, Ontario, Chino, and Colton. All are garden spots, and by the unwitting agency of man most of them have come to possess a fairly extensive molluscan fauna, many species of alien origin being now far more numerous than any of the native forms.

There have been few previous records for any of the localities of the region. Binney ['85] gives one or two species as being found in the county, but at least one of his records is without doubt erroneous. Stearns ['93] is the next author to report on specimens from our area, and his records are about all we have from the great desert region. The few records since that time are listed at the end of this paper.

My thanks are due to Dr. R. H. Tremper, of Ontario, who has generously supplied me with numerous specimens and data regarding the fauna of his immediate neighborhood. Practically all of his records are new and very interesting. I am also under obligations to Miss Nina G. Spaulding, of Redlands, whose enthusiastic efforts have aided not a little in increasing our knowledge. Data supplied through her or through Dr. Tremper are so noted by the use of their initials. I am also indebted to Mr. Sanford B. Dole, of Riverside, for the use of the accompanying photograph.

List of Species.

Helix aspersa Müller. Occasional around greenhouses at Redlands, but evidently not yet thoroughly at home.

Epiphragmophora traski (Newcomb). "Under dry leaves in small foothill cañon near Ontario" [R. H. T.]; also in San Antonio Cañon, two miles from mouth, elevation 2500 feet [R. H. T., April 4, 1908]; under leaves, Stoddard's Cañon, elevation 2500 feet [R. H. T., 1909].

This coast species apparently just enters the county as I have not encountered it even in the upper end of the San Bernardino Valley.

Epiphragmophora tudiculata (W. G. Binney). Mentone, under hedges; Highland, by the roadside after a rain; Arrowhead, Hot Springs; San Bernardino and vicinity; greenhouse in same city [R. H. T.]; Ontario, under stones and woodpiles [R. H. T., 1908–

1909]; also southeast of Ontario, some seven miles from the foothills [R. H. T., March, 1909]; Frankish Cañon, under stones, altitude 2500 feet [R. H. T., April 1, 1908]; at mouth of Stoddard's Cañon, at same elevation, under stones [R. H. T., 1909].

Specimens found by Dr. Tremper in January, 1908, in an orange grove at Ontario are particularly beautiful examples of the species, some showing a curious tendency toward albinism.

Vallonia pulchella (Müller). Redlands, common in greenhouses [S. S. B., 1903, '04, '06, '08].

Vertigo occidentalis Sterki. Bluff Lake, altitude 7,550 feet, 1907 (one specimen only) [S. S. B.]; in 1908 quite common in *spots* in the big Bluff Lake cienaga, in the cienaga just north, and along the "New England Trail," altitude 7,500 feet; also a few specimens in a cienaga west of Green Valley, altitude 6,900 feet [S. S. B.]. Many more specimens were sent from Bluff Lake during the present summer by Miss N. G. Spaulding.

Evidently an abundant species in the more Alpine regions of the San Bernardino Mountains, and I suspect that this or a closely allied form will also turn up in similar localities in the neighboring San Gabriel and San Jacinto Ranges.

Vertigo sp. Another form occurs with *V. occidentalis* in the neighborhood of Bluff Lake [S. S. B., Aug., 1908; N. G. S., Aug., 1909].

Vertigo rowelli (Newcomb). San Bernardino [Binney, '85, p. 156]. At best a doubtful record.

Vitrina alaskana Dall. San Bernardino Mountains—a common species at Bluff Lake and vicinity [S. S. B., Aug., 1907, Aug., 1908; N. G. S., Aug., 1909]; cienaga west of Green Valley [S. S. B., July, 1908]. Especially abundant under *willow* trees at the edges of a meadow.

Vitrea cellaria (Müller). In greenhouses, Redlands [S. S. B., 1904–'08].

Euconulus fulvus (Müller). Cienaga west of Green Valley [one specimen, S. S. B., July, 1908]. Altitude 6,900 feet. Bluff Lake Meadow (altitude 7,550 feet) and the neighboring cienages [S. S. B., Aug., 1907, Aug., 1908 (abundant); N. G. S., Aug., 1909 (abundant)]. Near mouth of Mill Creek Cañon [one specimen in drift, S. S. B., July, 1908]. Forest Home, altitude 5,200 feet, a colony of about 20 live individuals found by the writer under sticks on the bank of Mill Creek, June 12, 1909.

"San Gorgonio Pass" [Binney, '85, p. 68]. The exact locality of Binney's specimens is doubtful, but not of great importance as this is evidently a common mountain species, occurring throughout the San Bernardino Range. I have as yet seen no specimens from the San Gabriels.

Zonitoides orea (Say). Mouth of Stoddard's Cañon, near Ontario, under leaves [R. H. T., 1909]. Redlands, in greenhouses [S. S. B., 1904–1908]. Bluff Lake [S. S. B., 1907]; Bluff Lake and cienaga just north [S. S. B., Aug., 1908—ten specimens]; several specimens, same locality [N. G. S., Aug., 1909].

Zonitoides milium (Morse). Greenhouse, Redlands, one specimen [S. S. B., 1904].

Zonitoides minuscula (Binney). Greenhouse, Redlands [S. S. B., 1904].

Limax maximus Linnaeus. Redlands, in greenhouses in 1904 [S. S. B.]; now abundant about houses and in yards everywhere. Reported from same locality by Bartsch ['04, p. 12].

Ontario [R. H. T., 1908, 1909]. The last specimens sent me by Dr. Tremper were the most light-colored of the species I have seen in California.

Limax flavus Linnaeus. Redlands, with *L. maximus* [S. S. B., 1904].

Pyramidula cronkhitei (Newcomb). Cienaga, north of Bluff Lake Meadow, San Bernardino Mountains, altitude 7,500 feet [S. S. B., 16 specimens, Aug., 1908; N. G. S., Aug., 1909, abundant].

Punctum californicum Pilsbry. Occasional in Bluff Lake Meadow under sticks [S. S. B., Aug., 1908]; Cienaga, north of Bluff Lake, altitude 7,500 feet, not rare [S. S. B., Aug., 1908; N. G. S., Aug., 1909]. Being in doubt as to whether these specimens were correctly referred to this species, examples were sent to Mr. Bryant Walker, who confirmed the identification.

Punctum conspectum (Bland). Near Green Valley, San Bernardino Mountains, altitude 6,900 feet, 3 specimens [S. S. B., July, 1908]; Bluff Lake, one specimen [S. S. B., Aug., 1908].

Succinea oregonensis Lea. Lower end of the big Cienaga at Bluff Lake along the "New England Trail," 18 specimens [S. S. B., Aug., 1908] 13 specimens [N. G. S., Aug., 1909].

Lymnæa palustris (Müller). Bear Lake, altitude 6,700 feet, San Bernardino Mountains, abundant [S. S. B., 1907, 1908].

Lymnæa palustris nuttalliana (Lea). Creek and swamp at Bluff Lake, altitude 7,550 feet, abundant [R. D. Williams, 1905; S. S. B., 1907, 1908; N. G. S., 1909]. These specimens very uniform in appearance. Bear Lake, intergrading with typical (?) palustris, common [R. H. T., Aug., 1902; S. S. B., Aug., 1907, 1908].

Lymnæa humilis modicella (Say). On flower pots in greenhouses, Redlands, abundant [S. S. B., 1904–'08].

Lymnæa caperata Say. A single very juvenile specimen collected by Dr. Tremper in a pool in San Antonio Creek, 2 miles from mouth [April 4, 1908], was identified as this species by Mr. F. C. Baker.

Lymnæa bulimoides Lea. Mojave River, near Daggett [Stearns, '93].

Physa gyrina (Say) ? Redlands, in irrigating ditches; Garlick Springs [Stearns, '93]; Daggett [Stearns, '93].

I suspect that most if not all the Southern California records of *P. gyrina* need re-examination, and the above will more than likely prove to be varieties of *P. virginea* Gould.

Physa lordi Baird. Artificial pond, Ontario, the water of which comes from Hermosa Cañon [R. H. T.]. Specimens of this fine large species were sent to Mr. F. C. Baker, who agrees with me in referring them to *P. lordi*.

Physa virginea Gould. Ditches and reservoirs in Redlands, common [S. S. B., 1907, 1908].

Physa virginea traski Lea. Main irrigating ditch of Ontario, near mouth of San Antonio Cañon, altitude 2,200 feet [R. H. T.].

Physa cooperi Tryon. Watering trough in City Creek Cañon, San Bernardino Mountains [S. S. B., Aug., 1907, July, 1908]; Bear Lake, altitude 6,700 feet [S. S. B., Aug., 1907–'08].

Physa politissima Tryon. Bear Lake, altitude 6,700 feet, not uncommon [S. S. B., 1907, 1908].

Dr. Pilsbry, to whom I sent specimens of this and the preceding species, and to whom I owe their determinations, wrote as follows: "It should be said that the synonymy of West Coast Physas has never been worked up, and the ultimate names which will be used cannot now be decided, but your specimens correspond closely to the *type lots* of the forms mentioned, whether these be species or varieties."

Planorbis trivolvis Say. England's Park, Redlands; swamp and creek at Bluff Lake [S. S. B., 1907, 1908; R. D. Williams,

1905]; Bear Lake [R. H. T., 1902; S. S. B., 1907, 1908]; Daggett [Stearns, '93].

Planorbis parvus Say. Mojave River, near Daggett [Stearns, '93]; Swamp at Bluff Lake [S. S. B., 1907, 1908]; Bear Lake [S. S. B., 1907, 1908].

The specimens from Bear Lake were identified by Dr. Dall as *P. vermicularis* Gould. They certainly have a slightly different aspect from the Bluff Lake specimens, but I doubt if they are distinct.

Paludestrina stearnsiana Pilsbry. Rill near mouth of Mill Creek Cañon, San Bernardino Mountains, very abundant in July, 1908 [S. S. B.], but a rather hasty search in the same locality one year later did not yield a specimen.

Mountain Home Creek, San Bernardino Mountains, altitude 3,600 feet [S. S. B., July 11, 1909].

[*Paludestrina protea* Gould. In numerous collections I have seen large series of this species in a subfossil condition which were distributed some years ago by an unknown collector as from the "Mojave Desert." They are probably from San Bernardino County, so I record them here, although "Colorado Desert" may have been what the label meant. As the species is known to exist in Inyo and Riverside Counties, it may reasonably be expected to turn up in the living condition in this county as well.]

[*Valvata lewisii* Currier. San Bernardino Mountains, Cal. [fide Dall, '05, p. 123; also see Walker, '06, p. 26].

I have not seen any of Dall's specimens, but I have no doubt whatever that they really represent not *V. lewisii*, but the following form:]

Valvata humeralis californica Pilsbry. Swamp at Bluff Lake, altitude 7,550 feet [S. S. B., Aug., 1907, 1908; N. G. S., Aug., 1909—not very abundant].

Bear Lake, altitude 6,700 feet, the type locality [S. S. B., Aug., 1907, 1908].

For this form beside the references given above under *V. lewisii*, see Berry, '08, p. 122, and Pilsbry, '08, p. 82.

Anodonta californiensis (Lea) var. Chino Creek. S. of Ontario [R. H. T., 1908].

Musculium raymondi (J. G. Cooper). Swamp and creek at Bluff Lake, large and abundant in 1905 [R. D. Williams]; very common but small in 1907 [S. S. B.]; more rare in 1908 [S. S. B.] and 1909 [N. G. S.]; apparently being replaced by the following species.

Pisidium californicum (Newcomb ?). Swamp and creek at Bluff Lake, common in 1907 [S. S. B.], abundant in 1908 [S. S. B.], and 1909 [N. G. S.].

Pisidium ashmuni Sterki. Swamp at Bluff Lake [S. S. B., 1907]. Identified by Dr. Sterki.

Specimens of *Pisidia* have also been found in Kid Creek, San Bernardino Mountains [N. G. S., Aug., 1909], and in Mill Creek at Forest Home, altitude 5,200 feet [S. S. B., July, 1908], but have not as yet been determined by Dr. Sterki.

Bibliography.

Bartsch, Paul. *Limax maximus* L. in California. Nautilus, XVIII, p. 12, May, 1904.

Berry, S. S. Molluscan Fauna of the San Bernardino Mountains, California. Nautilus, XXI, p. 121, March, 1908.

Binney, W. G. A Manual of American Land Shells. Bull. U. S. N. M., No. 28, 1885.

Dall, W. H. Alaska—Land and Fresh Water Mollusks. Harr. Alaska Exp., Vol. XIII, N. Y., 1905.

Grinnell, Joseph. Biota of the San Bernardino Mountains. Univ. Cal., 1909.

Pilsbry, H. A. Notes on Plate XI. Nautilus, XXI, p. 133, April, 1908. *Valvata humeralis californica*, n. subsp. Nautilus, XXII, p. 82, Dec., 1908.

Stearns, R. E. C. S. Report on the Land and Fresh-Water Shells Collected in California and Nevada by the Death Valley Expedition, Including a Few Additional Species Obtained by Dr. C. Hart Merriam and Assistants in Parts of the Southwestern United States. N. Amer. Fauna, No. 7 (U. S. Dept. Agric.), May, 1893.

Sterki, Victor. A New Californian Vertigo. Nautilus, XXI, p. 90, Dec., 1907.

Walker, Bryant. Notes on Valvata. Nautilus, XX, p. 25, July, 1906.

RANGE OF LYMNÆA UMBILICATA.

BY FRANK C. BAKER.

This recently recognized and very distinct species has been reported from a number of rather widely separated localities. Its range would seem to be from Ontario and Northern Maine west to southeastern Michigan and south to New Jersey. It has doubtless been identified as *humilis* and will be found in many collections under this all embracing name. *L. umbilicata* is not a race of *L. cubensis*, as suggested by Mr. Walker, but a distinct species, the radula having tricuspid laterals where those of *cubensis* are bicuspid.[1]

The known records are as follows:

United States.

Connecticut: Small stream emptying into Farmington River, Unionville, Hartford Co. (Baker).

Maine: Buckfield, Oxford Co. (J. A. Allen); Woodland, Aroostook Co. (Nylander); Fox Island, Penobscot River, Knox Co. (Jackson).

Massachusetts: New Bedford, Bristol Co. (Adams); Brook near Cabot's Park, Newton; Charles River above Watertown, Middlesex Co. (Baker); Swampscott, near Lynn, Essex Co. (Tufts); Southborough, Worcester Co. (Bos. Soc., N. H.); Salem, Essex Co. (True); Essex Co. (Russell); Westfield, Hampden Co. (Smith. Coll.).

Michigan: Otter Lake, Lapeer Co. (Walker).

New Jersey: Drainage ditches east of Burlington, Burlington Co. (Baker; Pilsbry).

New York: Maplewood Park, Rochester, Monroe Co.; South end Cayuga Lake, near Ithaca, Tompkins Co. (Baker); Charlotte Lake, Columbia Co. Lea).

Rhode Island: The Fountain, Pawtucket, Providence Co. (H. F. Carpenter); Rhode Island (Walker).

British America.

Ontario: Ottawa, Carleton Dist. (Heron); Carleton Co. (Walker).

[1] See Mr. Walker's excellent article in Ottawa Nat., XXII, page 89, for the distinguishing characteristics of *L. umbilicata*.

THE MOLLUSCA OF DOUGLAS COUNTY, KANSAS. GASTEROPODA.

BY G. DALLAS HANNA.

As one travels westward from the Mississippi River, the gradual diminution of the forest growths is very apparent. Tracts of timber get smaller and smaller and the trees become more stunted in growth until when the middle of Kansas is reached there are only a few cottonwoods, confined to a narrow belt along the banks of streams. Eastern Kansas is then a transition zone, where the timbered regions of the east fade gradually into the vast semi-arid plains of the southwest.

A botanical condition such as this is bound to have a very great influence upon a group of animals as closely associated with vegetable growths as the land mollusks are. We find some species—as the majority of the Polygyras for instance—extending only as far west as the trees go. Moisture and shade are requisites to their existence, and we find them becoming rarer in direct proportion to the decrease in vegetation. They have migrated westward just as fast but no faster than the trees.

And on the other hand there are some species of the plains area which do not extend appreciably into the timbered regions. On the border-line then, as we would expect, we find an intermingling of the two faunas.

Douglas County is a typical border county. Trees exist in little patches here and there but are mostly confined to the near vicinity of streams. Mollusks are not plentiful and generally distributed, but are addicted to living in colonies in the patches of trees.

Among the most important tracts of timber conchologically is Blue Mound, situated six miles southeast of Lawrence. This little hill which rises two hundred and fifty feet above the river flood plain, supports an excellent growth of small trees. Under the dead leaves and loose stones the small snails are to be found more abundant than any place else in the county.

The outcropping limestone ledges furnish several species which belong in general to the southwestern plains fauna. *Bulimulus dealbatus*, *Vallonia parvula*, *Bifidaria procera* and *Zonitoides singleyana*, are abundant in some such localities where there are no trees for miles.

Localities favorable for fresh-water snails are rare. The only

bodies of standing water in the county are small, and with one or two exceptions are artificial ponds. Horseshoe Lake and Lake View are natural basins but both are small and contain but few mollusks. The small streams emptying into the Kansas River contain a few shells very locally distributed. The River is too sandy for these animals.

The family *Ancylidæ* seems not to have a representative in these waters.

Very little collecting previous to 1908 has ever been done in Douglas County. *Polygyra m. chadwicki*, a dentate variety of *Polygyra multilineata* was described by Ferriss in the NAUTILUS for August, 1907, from specimens collected along the Kansas River at Lawrence. Aside from this one reference I have never found the shells of this county alluded to. Therefore I append the following list, based upon two years' collecting in which the entire county has been thoroughly searched. Probably not many more species will be collected. Four or five are withheld from this list because of uncertain identification.

Dr. V. Sterki has examined the *Pupidæ*, and Mr. F. C. Baker, the Lymneas, to both of whom I am very grateful.

Polygyra profunda Say.

Polygyra albolabris alleni Wetherby.

Polygyra multilineata Say.

Polygyra multilineata chadwicki Ferriss.

Polygyra divesta Gould. A single specimen found in drift along the Kansas River at Lawrence.

Polygyra clausa Say. With the exception of *P. profunda* and *P. albolabris alleni*, which range into Shawnee County on the west, Douglas County marks the extreme western range of the Mesodons. All the species are rare in this locality, and are found on the northern shaded slopes of hillsides which have limestone outcropping.

Polygyra dorfeuilliana Lea. Dead shells were found under conditions such that the species must be living here.

Polygyra monodon Rackett. This form lives on Blue Mound.

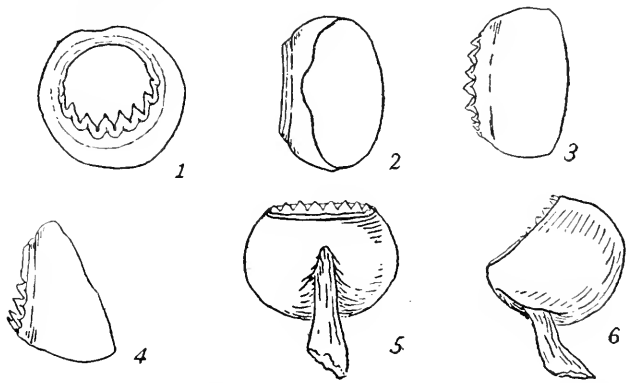
Polygyra fraterna Say. The common Polygyra of Kansas. Found everywhere.

Polygyra fraterna aliciæ Pilsbry. Occasionally found with *P. fraterna*.

(*To be continued.*)

NOTES.

SUCKERS FROM THE BIG SQUID.—On visiting Provincetown in August I made inquiries regarding the Giant Squid taken the last of March, 1909, off Highland, Truro, Mass., and mentioned in THE NAUTILUS for July, 1909. I was unfortunate in not securing the beaks which had been thrown away, but I saw the $7\frac{1}{2}$ foot tentacle, which was preserved in dry salt. I obtained the cartilage of one of the suckers, and, with permission from the owner, cut off one of the suckers about mid way on the tentacle. As this is the only specimen taken in Massachusetts I have thought it might be of sufficient interest to the readers of THE NAUTILUS for me to give sketches to show the shape of this cartilage and the curious arrangement of the serration of the margin.



Figs. 1, 2, 3, 4 are different views of the cartilage of one specimen, while Figs. 5 and 6 are the views of a sucker cut from the middle of the tentacle. All figures are magnified twice.

The tentacle is now in the possession of a gentleman in Provincetown, Mass.—J. HENRY BLAKE.

HOMALOGYRA ATOMUS IN RHODE ISLAND.—In a recent number of the NAUTILUS I mentioned the discovery of *Homalogyra atomus* on the New England coast at Hampton, N. H. It was first discovs ered by Philippi in Sicily; since then it has been found in other parts of the Mediterranean, Norway, England and France, but this is the first time it has been recorded on this side of the Atlantic. Miss M. W. Brooks has lately found this species in shell sand, from

Newport, R. I. Its occurrence north and south of Cape Cod indicates a somewhat wide distribution of the species.—EDWARD S. MORSE.

JOSEPH F. WHITEAVES.[1]—Dr. Joseph Frederick Whiteaves, the distinguished Palæontologist of the Canadian Geological Survey, died on the 8th of August, 1909, after an illness of several months.

Dr. Whiteaves was born in Oxford, England, in 1835, and first came to this country in 1861 on a short visit, returning the following year to make his residence in Montreal, Canada, where for twelve years he was officially connected with the Montreal Natural History Society. In 1876 he was appointed Palæontologist of the Geological Survey to succeed the late Mr. E. Billings.

His works on the palæozoic and mesozoic fossils of Canada are monumental, and the broad scope of his work both in palæontology and zöology can only be appreciated by a perusal of his numerous papers which number nearly 150, in which over 450 new genera, species and varieties are described.

Dr. Whiteaves was of a generous and kindly disposition, always ready to aid and impart information. He was an ideal type of a man imbued with the professional spirit, striving for the best results, not satisfied with half measure, and ever urged on by the love of his work.

MISS J. E. LINTER.—We regret to announce the death of Miss J. E. Linter which occurred on August 30, 1909, at Twickenham, England. Her valuable collection of shells will be offered (as a legacy, on condition that it is accessible to the public) to the Exeter Museum.

WE learn with regret of the death, September 26th, of Professor Anton Dohrn, the founder and director of the Zoölogical Station at Naples.

MESSRS. FERRISS AND DANIELS are exploring the Kaibab and Kanab plateaus for shells and ferns. In this little-known country north of the Grand Canyon of the Colorado, they report beautiful scenery, a superb climate, and plenty of shells.

ERRATA.—In the last number the following errors should be noted: P. 67, line 13 from bottom, last word, should be "*more*" in place of "*less;*" line 4 from bottom should be "*No. 10. l*" in place of "*10.*"

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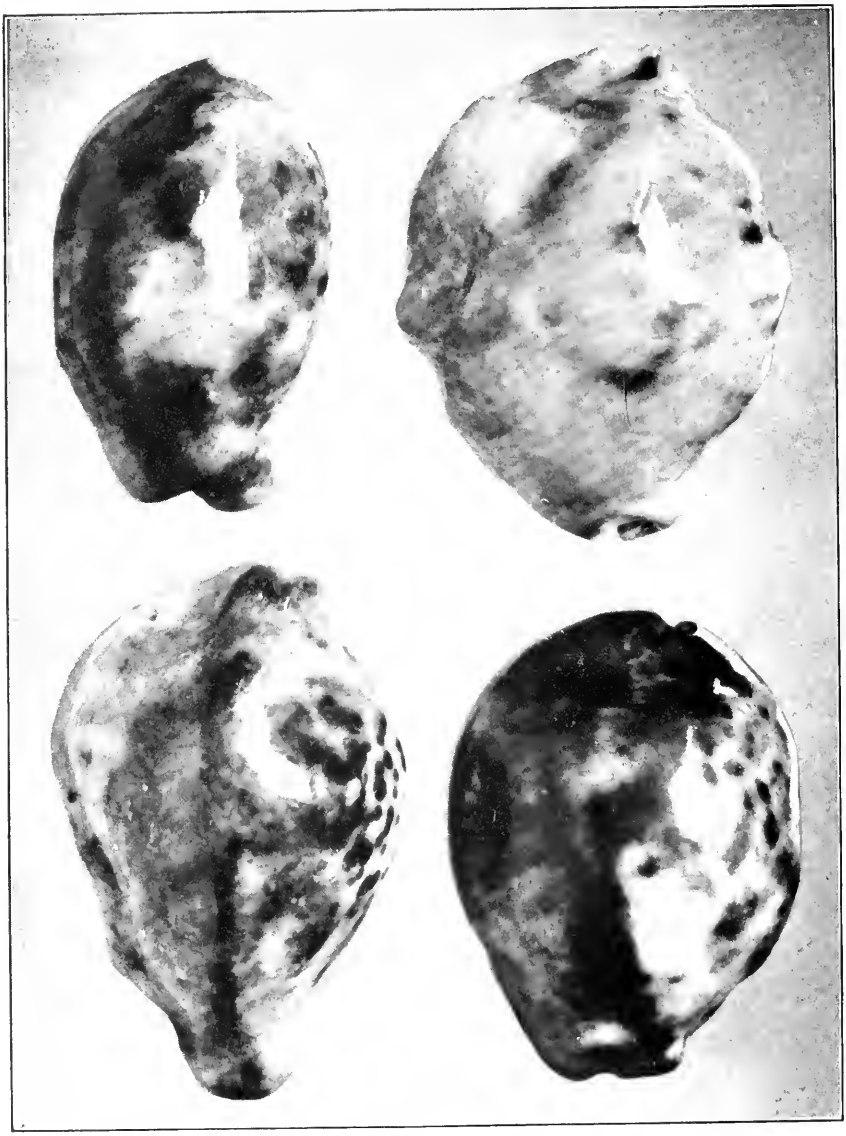
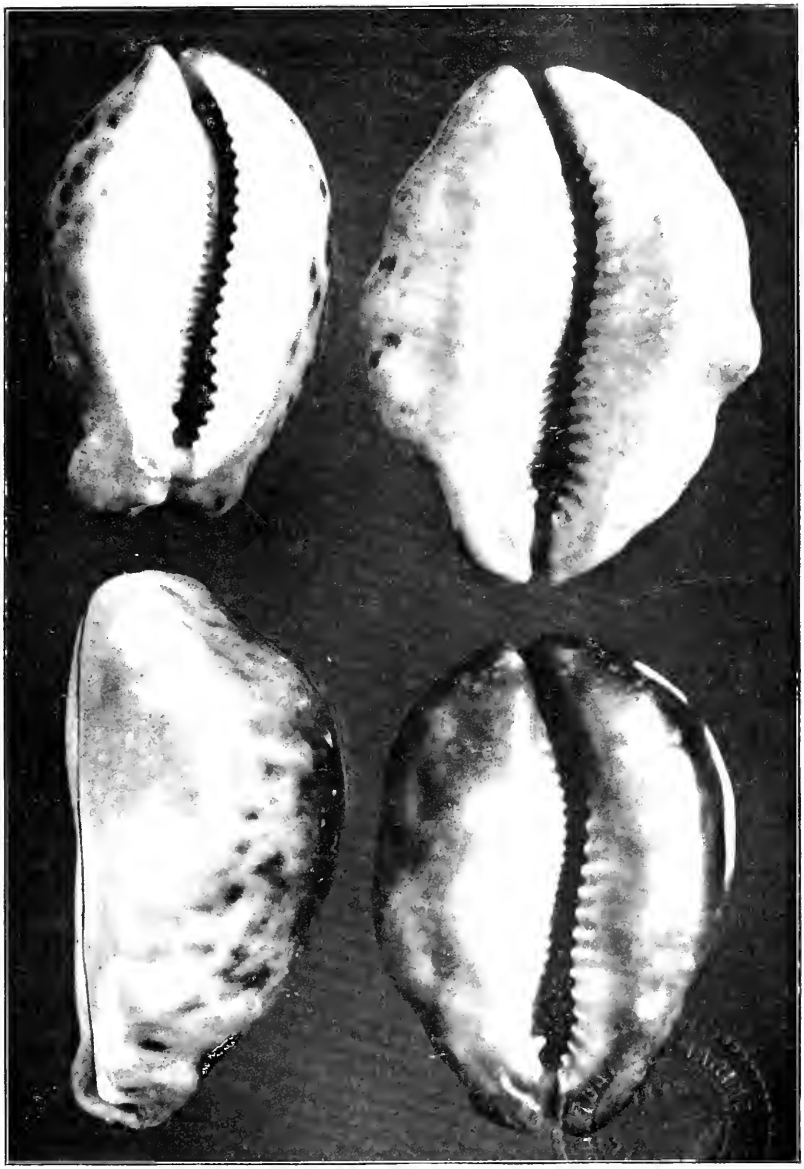
[1] Taken in part, from The Ottawa Naturalist, September, 1909.



CYPRÆA TIGRIS FROM A. DA C. GOMEZ COLL.



CYPRÆA TIGRIS FROM A. DA C. GOMEZ COLL.

THE NAUTILUS.

VOL. XXIII. DECEMBER, 1909. No. 7

ON SOME DEFORMED CYPRÆA TIGRIS FROM THE COLLECTION OF A. DA COSTA GOMEZ.

BY H. A. PILSBRY.

Many years ago the conchologists of Europe were astonished to receive from New Caledonia certain cowries which had the aspect of such well-known species as *C. moneta*, *lynx* and *mappa*, yet differed by the produced and calloused ends, attended with more or less thickening of the enamel and a degree of melanism, or clouding of the color-pattern. Several of these shells were named as distinct species by Crosse, Marie, Montrouzier and others. British writers generally did not admit their validity, considering them pathologic forms, due to some diseased condition of the mantle, a view ridiculed by Crosse in his witty review of G. B. Sowerby's monograph of Cypræa in the Thesaurus Conchyliorum. Mr. S. Raymond Roberts in his monograph[1] treats them as varieties. M. Ph. Dautzenberg has recently discussed these forms, figuring several of them.[2] The cause of the rostration and hypertrophic deposit of calcareous material has never been really settled, so far as I know, by observations on the living animals. The occurrence of so many forms modified in the same manner, in one locality, points to the action of me specific cause which might perhaps be recognized by an observer on the spot. It seems, however, that the modifications do not have racial significance. A somewhat similar formation characterizes some undoubtedly "good" species elsewhere, such as *C. scottii* and *C. problematica*.

[1] Manual of Conchology, Vol. VII.

[2] Journal de Conchyliologie, 1906, p. 263. plate ix.

Mr. A. DaCosta Gomez has called our attention to several New Caledonian examples of *Cypræa tigris* L. in his collection which show a rostration like the New Caledonian forms mentioned above, together with others diversely modified; and as such forms have not, to our knowledge, been noticed in this species, we have figured four of them on plates vii and viii, the two plates representing different views of the same specimens.

I. The upper left hand figures show a shell having a broad chestnut dorsal streak, the rest of the back being clouded with chestnut, light blue and dull pale brown. On the margins may be seen the characteristic dappled coloring of *tigris*. The base is normally colored. At the anterior end there are large callous lumps. The posterior end is also a little produced. Length 83 mm.

II. Upper right figures. This shell is broad and very heavy (weighing $7\frac{1}{8}$ ounces). The dorsal streak is interrupted, chestnut, partially overlaid with bluish callus. Elsewhere it is a soiled cream-white, obscurely and irregularly mottled. The base is stained with yellow around the mouth. The sides are very heavily calloused and lumpy. Length 90 mm.

III. Lower left figures. This shell is heavily calloused and produced at the ends and on the right margin. The spotted *tigris* pattern appears on the other side, but is covered by a dark enamel in the middle of the back. Base white, with some yellowish suffusion in places. Length 98 mm. This shell is characteristically New Caledonian in appearance.

IV. Lower right figures. A broad form, heavily calloused at the sides. The dorsal streak is dark purplish-brown; remainder of the back bluish-white, irregularly mottled and spotted with orange-brown and purple-brown, ends blackish. The base and teeth are brownish-yellow except for a pure white area on the inner lip. Length 85 mm.

ESSEX COUNTY NOTES.

BY REV. HENRY W. WINKLEY.

My last article was an urgent invitation to fellow-laborers to inspect mud. We may now view some results of the inspection.

Just south of Cape Ann, Mass., is a bay with many branches, forming harbors for Marblehead, Salem, Beverly and Danvers. The

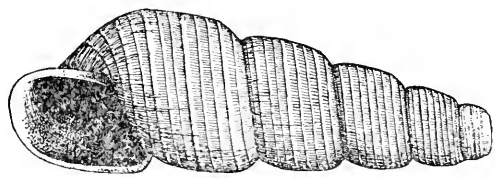
inner waters, *i. e.*, at Danvers, seemed to be favorable for a colony of the forms which are common south of Cape Cod, but local and in sheltered places north of that cape. Only a partial examination has been made, but results are interesting. One mud flat of small area, and uncovered at low tide, was swarming with life. Literally I obtained quarts of *Gemma gemma*. With these were other species more or less abundant. *Columbella*, *Ilyanassa*, *Polinices* and such forms are expected and were found as usual. *Odostomia* revealed *trifida*, *bisuturalis*, *winkleyi* and a new species described below. I was able to secure here a living specimen of the disputed *fusca*, and observe the animal. Unlike some of this group, that are said to be timid in captivity, *fusca* was very active. Bulletin 37 of the U. S. Natl. Mus., plate xxvi, figs. 1 and 2, are labeled animal of *Turbonilla interrupta*. Slight changes would make the drawing for *fusca*. The plate gives the front of the foot in four lobes; for *fusca* it should be a continuous curve. From the plate one would infer that the mentum was of two flaps, one overlapping the other. In *fusca* this would not be correct, but a deep groove runs along the median line. The front of the mentum is a double curve, and its end is held close to the surface ahead of the foot in crawling, as if it was feeling the way. Eye spots are easily seen at the bases of the tentacles. The animal is semi-transparent, with parts a deep maroon. The tentacles are slender and held close to the mentum.

The above-named species were found at the headwaters, but no evidence of *Turbonilla*, as I had hoped. Rowing down river I smelt them, and came back for my dredge. A dozen specimens of *T. winkleyi* were found, good size, but badly eroded. In other parts of the Danvers River *Venus mercenaria*, *Astarte nucula* and some other forms occur, but I postpone exact lists until more work can be done. One unusual find was a solitary specimen of *Bela bicarinata* var. *violacea* on a mud flat between tides.

Later work was done at Salem. The inner harbor revealed the last-named species, with beautiful violet coloring, especially when wet. Salem harbor is practically all mud bottom. *Polinices*, *Nucula*, *Yoldia*, *Crenella*, *Periploma*, *Lyonsia*, *Tellina*, *Nassa*, *Bela*, *Retusa*, etc., are obtained at moderate depths. Shore collecting revealed the usual species, with some things worth noting. *Acmæa testudinalis* is very small and *alveus* scarce. At one small cove at low tide, with eel grass, I found another colony of *Turbonilla winkleyi*.

Passing to the outer harbor there is a slight change. More species of *Bela*, for example. Here I met a surprise in finding a third colony of *Turbonilla*. As the outer harbor is practically open sea, the occurrence is unusual. In fact the only locality known to me north of Cape Cod where that form occurs save in inner waters. So much ground remains to be examined that this report must be imperfect, yet the area covered showed *Astarte* very scarce. *Thyasira* lacking, and some other forms expected did not appear. I am told that there are small beds of them in places not yet dredged.

A few years ago the writer was stationed near New Haven. At that time I received much help from Dr. Bush, and together we examined many specimens of *Turbonilla*, *Odostomia*, *Bela* and other genera. It is my desire to recognize my high appreciation for her kind help by naming the following species for her. I am confronted with the fact that one *Odostomia* already bears her name. Not to be defeated in my purpose, I will use her first name, and am sure she will pardon me this time.



Odostomia (*Evalina*) *katherinæ*, new species.

Shell much smaller than *O.* (*E.*) *winkleyi*, bluish-white, semi-translucent. Nuclear whorls deeply obliquely immersed in the first of the succeeding turns, above which the tilted edge of the last volution only projects. Post-nuclear whorls well rounded, with a very strong beveled shoulder, marked by many very slender axial threads and a number of fine spiral lirations, of which one is at the angle of the shoulder, one on the shoulder a little nearer the suture than the angle; one forms the weak peripheral angle, and six others divide the space between the peripheral angle and the angle at the shoulder into subequal spaces. Sutures strongly constricted. Base short, well rounded, marked by spiral threads, of which the second one below the periphery is as strong as the peripheral one, the other four being of equal strength; the two basal ones dividing the space be-

tween the umbilical area and the stronger thread into three equal parts. Aperture very broadly oval, posterior angle very obtuse; outer lip thin, showing the external sculpture within; columella very slender, slightly twisted and very slightly revolute, provided with a very weak fold, which is scarcely discernible in the aperture, but becomes apparent when the pillar is exposed by grinding; parietal wall glazed with a light callus.

Specimens were found in the Danvers River, on a mud flat between tides, most of which are in the Winkley collection, and seven in the U. S. National Museum, cat. No. 208067. The one figured has $5\frac{1}{2}$ whorls and measures, length 2.15 mm., diameter 0.8 mm.

NEW HELICINA AND STROBILOPS FROM FLORIDA.

BY H. A. PILSBRY.

Several years ago Mr. G. H. Clapp called my attention to a form of *Helicina* differing in several respects from *H. orbiculata* Say, the specimens having been received from Mr. C. T. Simpson, who collected them at Lemon City, Florida. At about the same time Mr. Vanatta encountered the form in material from Lee Co., Fla., collected by Mr. C. B. Moore. He subsequently published a list of these shells (NAUTILUS for January, 1908, pp. 99–104), mentioning the form in question as *Helicina orbiculata* var. *clappi* Pils. MSS. No description has been published.

Helicina orbiculata was described from the mouth of the St. John's River. The types, four specimens, are still preserved with Say's label. They are globose, very pale greenish-white, and measure from alt. 6, diam. 6.8 mm., to alt. 6.3, diam. 7.7 mm. There is a distinct tooth at the junction of the columellar and basal lips. The periphery is well rounded.

In the St. John's River valley, away from the coast, and where calcareous material is almost wanting in the soil, there is a small race of *orbiculata*, measuring, alt. 5.5, diam. 6.8 mm., to alt. 4.5, diam. 5.1 mm.

H. orbiculata extends from Florida and Georgia west to Tennessee and western Louisiana. West and southwest of this it is entirely replaced by *H. orbiculata tropica* 'Jan.' Pfr., distinguished by its heavier shell and very thick lip.

HELICINA ORBICULATA CLAPPI, n. subsp.

The shell is less globose than *orbiculata*, tending to a more trochiform shape, the last whorl being very obtusely subangular at the periphery. The outer lip is more broadly expanded, thin, and there is only a weak angle or none at the junction of columella and basal lip. The color is white, very pale citrine, white with two red bands, or uniform red, the lip and apex pale.

Alt. 8, diam. 9 mm.

Alt. 7, diam. 8 mm.

Alt. 6.1, diam. 7.3 mm.

Distribution: Southern Florida, Dade, Lee and Monroe counties; types from Miami, Dade Co., collected by S. N. Rhoads and H. A. Pilsbry, 1899. On the east coast *H. o. clappi* extends as far north as Palm Beach (Pilsbry, 1899); on the west coast to Evans' Plantation on the Manatee River (C. T. Simpson).

Key to Subspecies of H. orbiculata.

a. Last whorl globose, periphery well rounded; a distinct tooth or angle at base of the columella.

b. Lip thin or not much thickened, *H. orbiculata.*

bb. Lip much thickened, *H. o. tropica.*

aa. Last whorl very obtusely subangular, the shape approaching trochiform; no distinct tooth at base of the columella, *H. o. clappi.*

STROBILOPS FLORIDANUS, n. sp.

The shell is conic with convex outlines, almost dome-shaped; the periphery only weakly angular, the base convex; rather solid; brown, the summit whitish-corneous. Whorls $5\frac{1}{2}$, the first two smooth, the rest sculptured with narrow, rather widely separated ribs (about 30 on the last whorl). These ribs continue on the base, which is radially ribbed. Aperture semilunar, the peristome thick, narrowly reflexed, brown or whitish; parietal callus rather thick at the edge. Parietal lamella emerging to the edge of the callus, fully a whorl long. Infraparietal lamella scarcely emerging, penetrating as far inward as the parietal lamella. The inner half of this lamella and the parietal is nodose, the nodes minutely asperate. Interparietal lamella very low, about a half whorl long, nodose, penetrating as deeply as the parietal lamella. There is one axial lamella and four basal plicæ,

the outer one peripheral in position; a single palatal plica is generally developed. These plicæ form a curved, very obliquely radial series, the inner end near the aperture. The two inner basal lamellæ are much stouter and higher than the others, the second from the axis (or third, counting the axial) being the longest and highest of the plicæ.

Alt. 1.8, diam. 2.5 mm.

Florida: Type No. 77044 A. N. S. P., from Miami, collected by S. N. Rhoads, 1899. Also widely distributed over the State. Tallahassee (C. W. Johnson, 1900), St. John's valley, Volusia and Marion counties (Johnson and Pilsbry, 1894) and many other localities.

This species resembles *S. virgo* Pils. in shape and peristome, but it differs in the more widely spaced ribs, continued over the base. It differs from all known North American species by the *much more deeply entering parietal lamellæ*, the inner ends of which pass under the parietal callus of the aperture. In other species these lamellæ are only about a half whorl long. The inner basal plicæ are also placed more deeply within than in other species. *S. texasiana* Pils. and Ferr. resembles *S. floridana* in shape and in having a ribbed base, but the sculpture is much closer and the lamellæ do not extend so far inward.

S. floridanus is a common and widely distributed species in Florida. A depressed and angular form of *S. labyrinthicus* resembling *S. l. strebeli* occurs in some places, and *S. hubbardi* (A. D. Brown) also has a wide distribution on the peninsula and keys.

Several other races of *Strobilops* will be defined in a future paper. The shells have to be opened carefully to demonstrate the internal structure, but fresh specimens can usually be determined without opening. Information is especially desired by the writer on the forms of New York State, and will be duly credited in a monograph of that fauna now in preparation.

MOLLUSKS FROM KANSAS AND OKLAHOMA.

BY FRANK C. BAKER.

During the past year Mr. F. B. Isely, Professor of Biology in the Oklahoma University Preparatory School, Tonkawa, Oklahoma, has sent to the Chicago Academy of Sciences several interesting lots of

shells from Kansas and Oklahoma. As this region is not well known conchologically, it has been thought that a list of the species would be of value as a contribution to the subject of geographic distribution. The region includes Grant and Kay counties, Oklahoma, and Sumner, Harper and Kingman counties, Kansas. The collection is now deposited in the Chicago Academy of Sciences. My thanks are due to Mr. Bryant Walker and Dr. V. Sterki for assistance in determining critical material.

PELECYPODA.

Lampsilis anodontoides (Lea). Chikaskia River, Tonkawa, Oklahoma.

Lampsilis subrostrata (Say). Spring Creek, Grant county, Oklahoma.

Lampsilis parva (Barnes). Bluff Creek, Grant Co., Oklahoma.

Lampsilis purpurata (Lamarck). Chikaskia River, Tonkawa, Oklahoma.

Lampsilis gracile (Barnes). Shoofly Creek, Williston, Oklahoma.

Plagiola donaciformis (Lea). Chikaskia River, Hunnewell, Kansas.

Tritogonia tuberculata (Barnes). Chikaskia River, Tonkawa, Oklahoma.

Anodonta grandis Say. Chikaskia River, Tonkawa, Oklahoma; Chikaskia River, Williston, Oklahoma.

Anodonta corpulenta Cooper. Duck Creek, near Tonkawa, Oklahoma.

Anodonta imbecilis Say. Shoofly Creek, Williston, Oklahoma.

Symphynota complanata (Barnes). Chikaskia River, Tonkawa, Oklahoma; Chikaskia River, Williston, Oklahoma.

Unio tetralasmus camptodon Say. Spring Creek, Anthony, Kansas.

Unio tetralasmus sayi Ward. Spring Creek, Grant Co., Oklahoma.

Quadrula undulata (Barnes). Chikaskia River, Tonkawa, Oklahoma; Chikaskia River, Drury, Kansas; Shoofly Creek, Williston, Oklahoma.

Quadrula undulata latecostata (Lea). Shoofly Creek, Williston, Oklahoma.

Quadrula lachrymosa (Lea). Chikaskia River, Tonkawa, Oklahoma; Chikaskia River, Drury, Kansas.

Quadrula pustulosa (Lea). Chikaskia River, Tonkawa, Oklahoma; Chikaskia River, Drury, Kansas.

Quadrula pustulosa var. Chikaskia River, Drury, Kansas.

A peculiar shell is associated with *pustulosa* at this locality. It is compressed, quite elongated, and the surface is ornamented with many olive-green rays, radiating from the umbones. It is smooth, like *schoolcraftensis*, but is much more elongated than that variety, to which the Oklahoma *pustulosa* might quite appropriately be referred. No specimens of the typical *pustulosa* have been seen from the region in question. Additional material may show this to be a recognizable race of *pustulosa*.

Quadrula rubiginosa (Lea). Chikaskia River, Drury, Kansas.

Quadrula coccinea (Conrad). Chikaskia River, Drury, Kansas; Chikaskia River, Tonkawa, Oklahoma.

Sphærium simile Say, variety. Tonkawa, Oklahoma; Wild Horse Creek, Spivey, Kansas.

A much elongated and very cylindrical shell, which may prove to be a race of *simile*.

Sphærium striatinum Lamarck. Sand Creek, Argonia, Kansas.

Musculium transversum (Say). Shoofly Creek, Williston, Oklahoma.

Musculium elevatum (Haldeman). Tonkawa, Oklahoma; Meridian Creek, South Haven, Kansas.

Not quite typical, the shell being more elongate ovate in outline than in typical *elevatum*.

GASTROPODA.

Physa crandalli Baker. Wild Horse Creek, Spivey, Kansas; Sand Creek, Argonia, Kansas; Meridian Creek, South Haven, Kansas; Spring Creek, Anthony, Kansas; Shoofly Creek, Williston, Oklahoma; Spring Creek, Grant Co., Oklahoma.

Physa ancillaria Say. Spring Creek, Grant Co., Oklahoma; Wild Horse Creek, Spivey, Kansas; Tonkawa, Oklahoma; Shoofly Creek, Williston, Oklahoma.

The specimens are exactly comparable with typical *ancillaria* from Philadelphia.

Physa anatina Lea. Tonkawa, Oklahoma.

Ancylus rivularis Say. Shoofly Creek, Williston, Oklahoma.

Planorbis trivolvis Say. Wild Horse Creek, Spivey, Kansas; Spring Creek, Grant Co., Oklahoma.

Planorbis deflectus Say. Spring Creek, Anthony, Kansas.

Lymnæa obrussa Say. Wild Horse Creek, Spivey, Kansas; Sand Creek, Argonia, Kansas.

Lymnæa parva Lea. Tonkawa, Oklahoma.

Lymnæa techella Hald. Tonkawa, Oklahoma.

Succinea avara Say. Spring Creek, Anthony, Kansas.

Succinea luteola Gould. Tonkawa, Oklahoma.

Agriolimax campestris Binney. Tonkawa, Oklahoma.

Polygyra fraterna Say. Tonkawa, Oklahoma.

THE MOLLUSCA OF DOUGLAS COUNTY, KANSAS. GASTEROPODA.

BY G. DALLAS HANNA.

(*Concluded from p. 83.*)

Polygyra fraterna friersoni Pilsbry. Very rare; a few specimens identical with specimens of this variety from southern Kansas have been found in this county.

Bulimulus dealbatus Say. This is evidently the form *liquabilis* Reeve, but I have not seen specimens of the subspecies to make comparison. It is found rather commonly on open rocky hillsides.

Pupilla muscorum Linnaeus. From river drift at Lawrence.

Pupilla blandi Morse. A few drift specimens have been picked up.

Pupilla hebes Ancey. Two specimens found in drift, one at Tecumseh and the other at Lawrence.

Pupoides marginatus Say. Common everywhere.

Bifidaria procera Say. Common in open places favorable for mollusks.

Bifidaria procera cristata P. & V. Rare this far east.

Bifidaria hordeacella Pilsbry. One specimen found in river debris at Lawrence.

Bifidaria holzingeri Sterki. Very rare; it gives way to the form *Bifidaria holzingeri fordiana* Sterki. Found in the woods of Blue Mound and elsewhere.

Bifidaria contracta Say. Common in timber lands.

Bifidaria armifera Say. Abundant.

Bifidaria pentodon Say. Found sparingly in the woods.

Bifidaria tappaniana C. B. Adams. Common on Blue Mound.

Bifidaria agna P. & V. Very rare; two specimens from drift debris of the Kansas river at Lawrence.

Vertigo ovata Say. Apparently rare.

Vertigo milium Gould. A few specimens came from Blue Mound.

Vertigo tridentata Wolf. Our commonest Vertigo; found on Blue Mound and in river drift at various places.

Strobilops affinis Pilsbry. Common in woody places.

Vallonia parvula Sterki. Very common where there is no shade.

Vallonia costata Müller. Drift specimens only have so far been found.

Cochlicopa lubrica Müller. Common on Blue Mound.

Agriolimax campestris Say. Not common.

Agriolimax agrestis Linnaeus. This is the common slug of Kansas.

Vitrea rhoadsi Pilsbry. This form is rather common in the woods.

Vitrea indentata umbilicata Cockerell. Abundant everywhere.

Vitrea milium Morse. This species is associated with *Z. minuscula*, but is less common in most places.

Zonitoides arborea Say. Abundant in all woods.

Zonitoides nitida Müller. Apparently a rare species and locally distributed. I have found it only near Lake View.

Zonitoides minuscula Binney. This species is common in open woodlands.

Zonitoides minuscula alachuana Dall. Found associated with the typical form but less common.

Zonitoides singleyana Pilsbry. A species of the open plains.

Zonitoides nummus Vanatta. Found at Lake View and at Blue Mound, in the woods on each occasion.

Euconulus chersinus trochulus Reinhardt. Found in the woodlands with *Z. nummus*.

Philomycus carolinensis Bosc. Rather common on Blue Mound. A number of specimens have been taken.

Pyramidula alternata Say. Abundant in wooded and rocky places.

Pyramidula asteriscus Morse. A few specimens have come from Blue Mound and more from river débris at various places in the county.

Helicodiscus parallelus Say. This species lives in colonies around the limestone bluffs altogether.

Helicodiscus eigenmanni Pilsbry. One specimen was picked out of drift from Lecompton; it probably washed there from farther west.

Punctum pygmaeum Draparnaud. Apparently rare, as it has only been found once, and then in river drift from Lawrence.

Succinea avara Say. Not common.

Succinea grosvenori Lea. Found in colonies in wet places.

Succinea rusticana Gould. Generally distributed, but it has not been found common.

Succinea stretchiana Bland. This is our common *Succinea.*

Carychium exile Lea. A colony of this species was found near the top of Blue Mound.

Helicina occulta Say. Drift specimens have been found at Lawrence in a situation that would lead one to suspect that it is a resident.

Lymnea techella Haldeman. Abundant in a drainage ditch south of Lawrence.

Lymnea columella chalybea Gould. Found in the Whitcomb greenhouse at Lawrence on the sides of flower-pots.

Lymnea dalli Baker. Found in the greenhouse with *L. columella chalybea* and also in river drift.

Lymnea elodes Say. One drift specimen is from Lawrence.

Lymnea obrussa Say. Rather common in a watercress spring west of Lawrence.

Lymnea parva Lea. Only a few specimens from river débris have been found.

Lymnea reflexa Say. This form used to be very common in Lake View, but the flood of 1903 swept almost all away.

Lymnea reflexa crystalensis Baker. Not common in this county.

Planorbis bicarinatus Say. Lake View and Rock Creek.

Planorbis trivolvis Say. Abundant in all ponds.

Planorbis deflectus Say. Lake View.

Planorbis parvus Say. A few specimens were found along the Kansas River.

Physa anatina Lea.

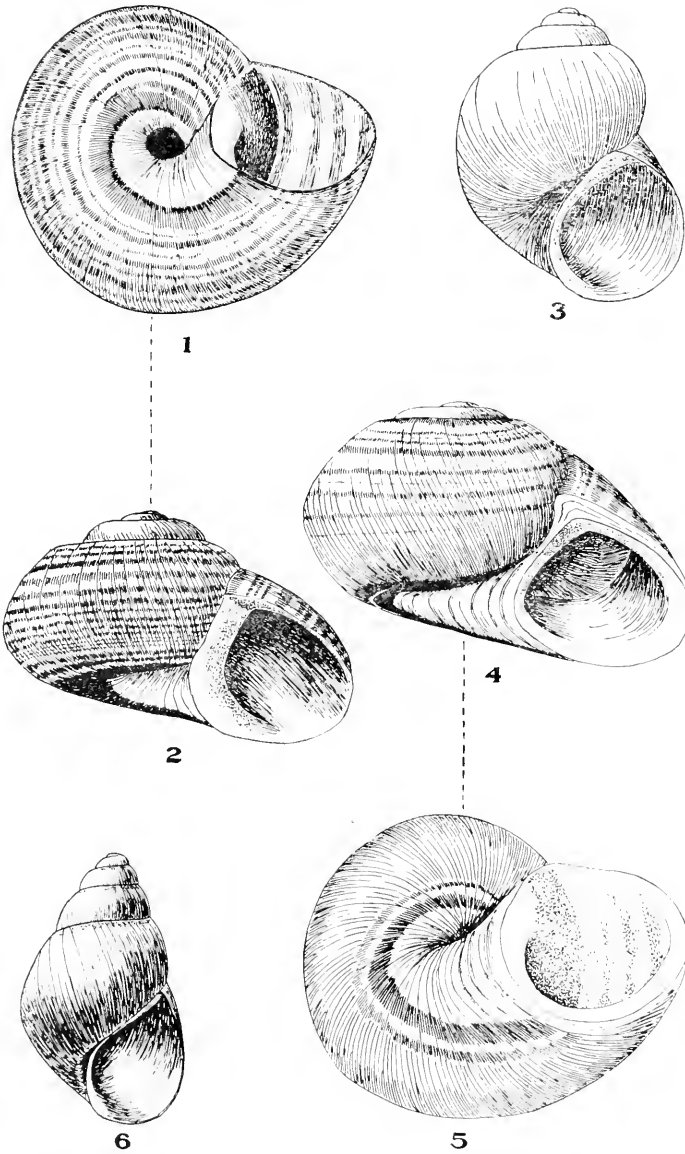
Physa oleacea Tryon. These two species were identified by Mr. Bryant Walker. All the specimens of this county seem referable to them.

Amnicola cincinnatiensis Lea. Found in mud creek commonly.

Amnicola limosa Say. A single dead shell from the Kansas River.

Campeloma decisum Say.

Campeloma subsolidum Anthony. These two forms live abundantly in the Wakarusa Creek, but are easily distinguishable.



MEXICAN AMNICOLIDÆ

THE NAUTILUS.

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NEW AMNICOLIDÆ OF THE PANUCO RIVER SYSTEM, MEXICO.

BY HENRY A. PILSBRY.

In the course of Mr. A. A. Hinkley's expedition to the Panuco river region in 1907 he found *Potamopyrgus coronatus* (Pfr.), *Paludestrina tampicoensis* Pils., *Cochliopa riograndensis* Pils. & Ferr., and an *Amnicola* identified as *A. guatemalensis* C. & F., but which on further study turns out to be a new species. Several more forms are now added by the expedition of 1909, among them a southwestern representative of *Somatogyrus* and some very handsome though small species of *Cochliopa*.

In the works of Crosse and Fischer and of von Martens, the American spinose Amnicoloids are referred to the genus *Amnicola*, in the belief that *Potamopyrgus* does not occur in America. This idea is in my opinion wholly erroneous. The American *P. coronatus* (Pfr.) has the dentition and the *viviparous reproduction* of the New Zealand type of *Potamopyrgus*. In New Zealand, as in America, both spinose and smooth forms occur. There is no conchological difference. No *Amnicola* is viviparous, and there is a perceptible if small difference in the shells, which are more compact and more solid in *Amnicola*.

The genus *Potamopyrgus* occurs also in the Antilles, South America, West Africa and Tasmania. Perhaps the British *Hydrobia jenkinsi* belongs to this genus. If viviparous it certainly does; but I have not investigated the species. Like *Planorbis*, *Viviparus*, *Lymnæa* and some other fresh-water genera, it seems that *Potamopyrgus* has a very wide geographic distribution. In female *Potamopyrgus* one finds the young shells as in the genus

Viviparus. This character serves to differentiate it from *Paludestrina*, which the smooth phase resembles in shell structure.

AMNICOLA CROSSEANA n. sp. Pl. ix, fig. 6.

The shell is perforate, ovate-conic, corneous, smooth, the growth-lines being scarcely visible. Whorls 5, the first very minute, the rest not very convex; suture but slightly impressed, having a gray border (by transparence) below. Umbilical region defined by an angle. Aperture ovate, slightly oblique. Peristome thin, narrowly olive-edged, represented by an adnate transparent callus on the parietal wall, which is rather long.

Length 3.1, diam. 2, length of aperture 1.6, width 1.1 mm.

Found only in ponds at La Barra, near Tampico.

This species was taken in considerable numbers. It has some resemblance to *A. guatemalensis* Crosse & Fischer (*Paludina hyalina* Morelet, not Anton), but on comparing a specimen received from Morelet it is noticed that *guatemalensis* has much more convex whorls and a shorter more rotund aperture. *A guatemalensis* is very closely related to *A. panamensis* Tryon. I doubt whether the two forms are specifically distinct.

A. crosseana, named for M. Hippolyte Crosse, is distinct from species of the Texan region by its lengthened shape, rather pointed apex, the weak convexity of the whorls, the long adnate parietal callus and the angulation around the umbilical region. With the milky corneous examples there are many of a brown or russet tint, probably owing to a thin ferrous incrustation.

Amnicola comalensis Pils. & Ferr. from Texas described in the Proc. Acad. Nat. Sci., Phila., 1906, p. 171, fig. 37, is a much stouter shell than *A. crosseana*. In the description the length was given by error as 3.9 mm. It should have been 2.9 mm.

SOMATOGYRUS MEXICANUS n. sp. Pl. ix, fig. 3.

The shell is perforate, globose, higher than wide, corneous, smooth, solid but rather thin. Whorls $4\frac{1}{2}$, strongly convex, parted by a deep suture, rather slowly increasing at first, but at the last whorl very rapidly enlarging. The last whorl is very convex, and descends more rapidly near the aperture. The aperture is ovate, subangular above. The outer lip is a little curved forward in the middle, or in other words, retracted above, thin-edged. The inner

lip is arcuate below, straightened above, heavily calloused in adults, especially above, and in contact with the preceding whorl only for a very short distance. There is a somewhat flattened umbilical area below the perforation, closely marked with growth-striæ, and bounded by an angle, which is sometimes not very distinct.

Length 5.3, diam. 4.5, aperture 3.1 mm.

Length 5, diam. 4.5, aperture 3.1 mm.

Coy river, on the road to Tampamolon; State of San Luis Potosi. Types no. 99023 A. N. S. P.

This is the first *Somatogyrus* from west or southwest of the Mississippi river system.

COCHLIOPA COMPACTA n. sp. Pl. ix, figs. 4, 5.

The shell is depressed, solid, rimate, pale greenish olive, encircled with few or many dark olive or blackish lines and narrow bands, and sometimes a few cream-white bands. Spire convex, very narrow when viewed from above. Whorls $3\frac{1}{2}$ to nearly 4, the early ones smooth, the last very wide, rounded, sculptured with low spiral threads or nearly smooth, descending to the aperture. The aperture is rotund-ovate, angular above, the outer lip slightly thickened, columellar and parietal margins thick. The umbilical area behind the columellar lip in fully adult shells is white and wide, the basal rimation either long or rather short.

Alt. 2, diam. 3.9 mm.

Choy river at the cave, south of Las Palmas, State of San Luis Potosi, Mexico.

This species is closely related to *C. picta*, differing by the larger aperture, compressed and generally closed umbilical region, and the peculiar area behind the columellar lip of adult shells. It was taken in considerable quantity.

The figures represent one of the most common color-forms. Other examples have lines and bands over the base also; and in some these markings are reduced to a few wide bands.

COCHLIOPA RIOGRANDENSIS Pils. & Ferr.

Valles river at Valles and Willis's ranch; Ganina river near Rascon. It is an abundant and variable species. In some examples the last whorl becomes free at the aperture, reminding one of the small shell described as *Valvata micra*. That species may prove to be a *Cochliopa*.

COCHLIOPA PICTA n. sp. Pl. ix, figs. 1, 2.

The shell is depressed, solid, narrowly umbilicate, there being a minute perforation and a curved, semicircular rimation where it enlarges at the last whorl; inner whorls pale olivaceous-corneous, the last encircled with many dark olive spiral lines and bands, which are almost imperceptibly raised. The spire is convex, and narrow viewed from above, the last whorl being very wide. Whorls $3\frac{1}{2}$, the last rounded, indistinctly plicate radially around the umbilicus. The aperture is rounded-ovate, angular above; outer lip thin; columellar lip rather heavily calloused; parietal wall short, calloused. Alt. 2.1, diam. 3.7 mm.

Coy river, near the ford on road to Tampamolon, State of San Luis Potosi, Mexico. A few smaller specimens were taken in the Ganina river near Rascon.

This species differs from *C. riograndensis* by its much smaller umbilicus, opening out only at the last half whorl. The spire is also more depressed. Many specimens were taken.

RECTIFICATION OF THE NOMENCLATURE OF THE NUDIBRANCHIATA IN LERMOND'S "SHELLS OF MAINE."

BY FRANCIS N. BALCH.

A meritorious attempt by Norman Wallace Lermond to list the mollusca of Maine has recently appeared under the title indicated above, and has been noticed in a recent number of the NAUTILUS.

Considering the confused state of our knowledge (or rather ignorance, for knowledge we have little) of the Nudibranchs, it is scarcely a reflection on Mr. Lermond that his list of this most interesting but neglected group reflects the state of knowledge of nearly forty years ago. It is a painful admission that the additions to our knowledge since that time have been few and scattering, but such as they are they should be recognized; and Mr. Lermond's list, otherwise of considerable use as almost the only recent list of Nudibranchs from the northeast coast, might do mischief if allowed to stand uncorrected in this particular—hence the following remarks.

Aeolis purpurea Stimps. in all probability is *Cratena pustulata* (A. & H.), as Bergh believed, and should be written accordingly, though with a query.

Aeolis stellata Stimps. is a *Coryphella* only very doubtfully distinct from the same author's *mananensis*, which in turn is either a synonym or a variety of Johnston's *rufibranchialis*—see a recent article by me in the NAUTILUS.

Eolis (*Cavolina*) *salmonacea* Couth. (now universally but perhaps erroneously treated as a *Coryphella*) although omitted from this list, has been reported by Verrill from Eastport. But what Verrill understood that species to be no one can say except that it certainly was not the same as what European authors understand. But then, what European authors understand is just as certainly not what Couthouy meant! The fact is the true *salmonacea* is entirely enigmatical. However it should appear in the list.

Dendronotus arborescens Müller should be *D. frondosus* (Ascanius)—this change has been universally adopted.

Cadlina repanda (A. & H.) should be *C. obvelata* (Müller)—same remark as last.

Issa lacera should be credited to (Abildgaard) instead of (Müller).

Doris bifida Verrill (entered twice in the list, once as a variety of *Acanthodoris pilosa* and once as a variety of *A. stellata*), *Doris stellata* Gmelin and *Acanthodoris citrina* Verrill, are all synonyms of *Acanthodoris pilosa* (Abildgaard); while *D. ornata* Verrill is at most a variety.

It is extremely doubtful whether *Lamellidoris diaphana* (A. & H.) really occurs on our coast. The common Maine form I believe to be *L. aspera*, mentioned below. However it correctly appears in this check list.

Probably nothing can be done with *Lamellidoris tenella* and *L. grisea* but to retain them as Mr. Lermond has done, though they are practically nomina nuda.

Ancula sulphurea Stimps. is a variety of *A. cristata* (Alder).

With regard to *Idaliella pallida* (Ag.) Gould, several errors appear to have crept in. No *Idaliella* occurs in Maine so far as I am aware. The only eastern American members of the sub-genus known, I think, are *pulchella* A. & H., found at Salem, Mass., in 1879, by Emerton, and *modesta* Verrill from Vineyard Sound and vicinity. There is, however, a *Lamellidoris pallida* of Ag. the distribution of which is such as Mr. Lermond's list gives, and of which *Proctaporia fusca* Stimps. is a synonym as given. The citation in synonymy of *Amoeroecium pallidum* Verrill 1873, is, of course, in-

advertence. *Amoeroecium* is a genus of compound Ascidians. Verrill, in his Rep. on Invert. of Vin. Sound, 1873, notices (on different pages) both *Amoeroecium pallidum* and *Onchidoris pallida* which latter is of course what Mr. Lermond intended to cite.

Pallida is, however, a synonym of *Lamellidoris aspera* (A. & H.). The entry, therefore, should stand as *Lamellidoris aspera* (A. & H.) with *Proctaporia fusca* Stimps. 1860, *Doris pallida* Ag. 1849, and *Onchidoris pallida* "Verrill," Verrill 1870 and 1873, in synonymy.

Lamellidoris muricatus should be written *muricata.*

Palio lessoni should be written *lessonii.*

UNIONIDÆ FROM SOUTHEASTERN ARKANSAS AND N. E. LOUISIANA.

BY E. G. VANATTA.

Mr. Clarence B. Moore collected the following species of *Unionidæ* while on an archaeological expedition during the winter of 1908–09.

Quadrula ebena Lea was everywhere the most abundant species. Dr. Pilsbry agrees with me in considering *Unio dombeyana* Val. in Humboldt et Bonpland, Rec. Obs. Zool., 1833, Vol. 2. p. 227, pl. 53, f. 1, a valid variety of *Quadrula heros* Say, instead of a synonym of *Q. trapezoides* Lea.

The originally varietal name *obesa* Simps. is used instead of *Tritogonia tuberculata* Bar. as the name *tuberculata* is preoccupied in *Quadrula. Unio tuberculatus* Barnes was grouped with *U. apiculatus* (now referred to the genus *Quadrula*) by Pilsbry in 1891 (NAUTILUS V, p. 76); a position confirmed by Dr. H. von Ihering in 1901 (NAUTILUS XV, p. 39), and by Dr. Arnold Ortmann this year. (Ann. Carnegie Mus., 1909, Vol. 5, p. 193.)

All the specimens of *Quadrula trapezoides, pyramidata, ebena, obesa* and *Plagiola securis* were smaller than the usual size.

I. Pyles Landing, Ouachita River, Calhoun Co., Arkansas. *Obovaria castanea* Lea and *Anodonta opaca* Lea.

II. Near Pigeon Hill, Ouachita River, Union Co., Arkansas.

Obovaria castanea Lea.
Plagiola securis Lea.
" *elegans* Lea.
Strophitus edentulus Lea.
Unio subgibbosus Lea.
Quadrula plicata Say.
" *heros dombeyana* Val.
" *metanevra* Raf.
" *asperrima* Lea.
" *obesa* Simps.

Quadrula sphærica Lea.
" *nodifera* Conr.
" *trigona* Lea.
Quadrula pyramidata Lea.
" *ebenus* Lea.

III. Caryville Landing, Ouachita River, Union Co., Arkansas.

Lampsilis hydianus Lea.
" *ligamentinus gibbus* Simps.
" *fallaciosus* (Sm.) Simps.
Obovaria castanea Lea.
Plagiola securis Lea.
Unio gibbosus Bar.
" *subgibbosus* Lea.
Quadrula perplicata Conr.
" *heros dombeyana* Val.
" *metanevra* Raf.
" *asperrima* Lea.
" *nodifera* Conr.
" *trigona* Lea.
" *pyramidata* Lea.
" *ebena* Lea.

IV. Seven Pine Landing, Bayou Bartholomew, Morehouse Parish, Louisiana. *Quadrula trapezoides* Lea.

V. Alabama Landing, Ouachita River near the mouth of Basche La Pierre Creek, Union Parish, Louisiana, 12 miles in a straight line above Ouachita, Louisiana.

Lampsilis ventricosus satur Lea.
" *ligamentinus gibbus* Simps.
" *fallaciosus* (Sm.) Simps.
" *purpuratus* Lam.
Plagiola securis Lea.
Unio gibbosus Bar.
Quadrula perplicata Conr.
" *heros dombeyana* Val.
" *trapezoides* Lea.
" *cylindrica* Say.
" *obesa* Simps.
" *sphærica* Lea.
" *pyramidata* Lea.
" *ebena* Lea.

VI. 15 miles below Monroe, Ouachita River, Ouachita Parish, Louisiana.

Lampsilis ventricosus satur Lea.
Obovaria castanea Lea.
Quadrula perplicata Conr.
" *heros dombeyana* Val.
" *trapezoides* Lea.
" *metanevra* Raf.
Quadrula asperrima Lea.
" *sphærica* Lea.
" *nodifera* Conr.
" *trigona* Lea.
" *pyramidata* Lea.
" *ebena* Lea.

VII. White Oak Landing, Boeuf River, Franklin Parish, Louisiana.

Lampsilis hydianus Lea.
" *anodontoides* Lea.
Quadrula heros dombeyana Val.
Quadrula trapezoides Lea.
" *asperrima* Lea.

VIII. Ouachita River, Catahoula Parish, Louisiana.

Quadrula heros dombeyana Val.
" *asperrima* Lea.
Quadrula ebena Lea.

IX. Black River, Catahoula Parish, Louisiana.

Lampsilis fallaciosus (Sm.) Simps.
Obliquaria reflexa Raf.
Quadrula heros dombeyana Val.
" *trapezoides* Lea.

VALVATIDAE OF THE WESTERN NORTH AMERICA.

BY HAROLD HANNIBAL.

While preparing a paper on the tertiary fresh-water fossils of Western North America it became necessary to go over the literature and examine all the *Valvatidae* available. This included specimens from the type localities of *V. utahensis* and *V. virens* and part of the original lot from which *V. humeralis californica* was described. There is therefore no doubt as to the authenticity of the determinations.

Two new fossil species have turned up in the Upper Lahontan (Quartenary) of Nevada and Southern Oregon, descriptions of which are given here. In a paper on fresh-water fossils now in progress, all the species will be figured together for comparison.

On account of the complex and unsatisfactory nature of a key the following table has been devised:

Broadly umbilicate.				Narrowly umbilicate.
V. whitei.	*V. humeralis.*	*V. calli.*	*V. virens.*	*V. utahensis.*
Spire barely raised above body whorl.	Rather low.	Very low to very high.	Moderately high.	High.
Smooth.	Smooth.	Smooth, carinate, or marked by spiral striae.	Fine growth striae.	Smooth.
Whorls rounded beneath.	Somewhat flattened.	Rounded or carinate.	Rounded.	Somewhat angular.
?	Blue-green or brown.	?	Light to dark green.	Pellucid.

V. lewisii Currier and *V. sincera* Say have been reported from west of the Rocky Mountains, but it is probable that all the specimens will prove to be *V. humeralis*. This is a somewhat variable and badly misunderstood species. It is apparently widely distributed over all the Pacific slope.

With the exception of *V. humeralis* all the species are abundant wherever they occur, but they are sporadic. This species is also sporadic but seldom occurs in large numbers.

Valvata humeralis Say.

Valvata humeralis Say. New Harm. Diss., II, 1829, p. 244. Mexico.

Valvata humeralis californica Pilsbry. Naut., XXII, 1908, p. 82. Bear Lake, Cal.

Small, smooth, brown or blue-green, spire variable but always low, umbilicus moderately broad, sutures slightly impressed. Characterized by a noticeable flattening about the umbilicus.

The barely matured specimens from Bear Lake do not show this character as noticeably as others in the writer's collection. This species has been identified by west coast conchologists as *V. virens*, *V. lewisii*, and *V. sincera*. The latter two can be easily eliminated but the specimens from several of the localities given with a question mark under *V. virens* may on re-examination prove to be *V. humeralis*. Not known as fossil.

Distribution.[1]

Mexico.

California.

* Bear Lake, San Bernardino Mts. (Berry).
* Bluff Lake, San Bernardino Mts. (Berry).
* Soap Lake, San Benito Valley (Hannibal).
* Pond, Likely, South Pitt Valley (Hannibal).
Slough, De Witte, Honey Lake Valley (Hannibal).

Oregon.

* Upper Klamath Lake (Hannibal).

Washington.

Lake Washington, Seattle (Randolph).

[1] * Seen by writer.
? Identification doubted.

Idaho.

Near Franklin (Hemphill).

Utah.

Near Salt Lake City (Yarrow and Hemphill).

VALVATA VIRENS *Tryon.*

Valvata virens Tryon, Proc. Acad. Nat. Sci., Phila., 1863, p. 148, pl. 1, fig. 11.

Spire moderately elevated, whorls rounded, umbilicus rather narrow, sutures moderately deep, shell marked by fine transverse striae, light green to deep green color.

It has been the custom to refer any western American Valvata of a green color or with an elevated spire to *V. virens*. The writer does not know of its authentic occurrence north of Clear Lake. Call's Great Basin specimens are *V. calli*. References to living specimens from northeastern California and southeastern Oregon are probably *V. humeralis*.

California.

* Clear Lake (Tryon, Cooper, Hemphill).

Alameda Co. (Cooper).

Antioch (Carlton).

* Pond near Watsonville (Laws, Hannibal).

? Willow Creek, Lassen Co. (McGregor).

Oregon.

? Grant's Lake (Cooper).

British Columbia.

? Nanaimo, Vancouver Is. (Dall).

? Lake Laggan, Rocky Mts. (Taylor).

Fossil: Santa Clara Beds (Pliocene).

Gelrich's coal mine, Santa Cruz Mts., Cal. (Cooper).

* Galabazos Canon, Santa Cruz Mts. (Hannibal).

Kettleman Beds: 10 miles east of Tulare Lake, west border of Kettleman Plains (Watts).

VALVATA UTAHENSIS Call.

Valvata sincera var. *utahensis* Call, Bull. 11, U. S. Geol. Sur., 1884, p. 44, pl. vi, fig. 1–3.

Characterized by its tabulated whorls, well elevated spire, and very narrow umbilicus, sutures moderately deep; lip slightly diagonal, usually angular below. Shell smooth, pellucid.

This species is known only from near the type locality. It reminds one of *V. piscinalis* of Europe.

Utah.

* Lehi, Utah Lake, near head of Jordan River (Call).

Fossil: Semifossil, Bonneville Basin, Utah (Call.)

VALVATA CALLI n. sp.

Valvata virens Call, Bull. 11, U. S. Geol. Sur., 1884, p. 21 (in part).

Shell varying from a high spire as in *V. virens* to a very low spire as in *V. lewisii;* sculpture, smooth, carinate tricarinate or marked by numerous spiral striae. Umbilicus rather narrow; whorls rounded in smooth or striate forms angular in carinate forms. Sutures deeply impressed in high forms, slightly in low. Type tricarinate with moderately elevated spire.

Measurements: *Type*, alt. 4.5 mm., diam. 5.5 mm., diam. of aperture 2 mm.; *flattened specimen*, alt. 4 mm., diam. 6 mm., diam. of aperture 2 mm., Marl, Upper Lahontan Quarternary, near Summer Lake, Ore. (F. M. Anderson).

Also from "Central Nevada, near R. R.," named in honor of the late Robert Ellsworth Call.

VALVATA WHITEI n. sp.

Spire depressed, barely raised above outer whorl, broadly umbilicate two whorls visible beneath; shell rather thick, smooth, marked by very faint growth lines; sutures very slightly impressed, whorls round.

Measurements: Alt. 2.5 mm., diam. 6 mm., diam. of aperture 2.5 mm., Marl., Upper Lahontan, Quarternary, near Summer Lake, Oregon (F. M. Anderson).

This species resembles a very large specimen of *V. humeralis*, but the umbilicus is much broader in specimens of a corresponding size. The species also has a much thicker shell.

Named in honor of the late Dr. C. A. White.

Stanford University, Cal.

AN APPARENTLY NEW SLUG FROM THE RIVER NILE.

BY T. D. A. COCKERELL.

The slug here described was kindly placed in my hands for determination by Professor H. M. Gwatkin, of Cambridge, England.

Veronicella nilotica, n. sp.

Length 43 mm., breadth 11½; unusually narrow and parallel-sided; sole narrow, its width about 4 mm., with 16 transverse grooves (not counting the lesser ones between each pair of strong ones) in 5 mm. of length; female generative orifice 1⅕ mm. from sole and 2⅘ from lateral margin, its distance from head about 27⅓ mm. Upper surface finely and densely tuberculate, some of the tubercles a little larger and more prominent than the others; hyponotum finely and more obscurely tuberculate. Color above (in alcohol) pale ochreous densely mottled with dark grey, the two colors about equal in amount; there is a faintly indicated pale dorsal band, on each side of which the dark mottling is heaviest; on each side at about 2 mm. from the margin, there is a very faint suggestion of a dusky stripe. The underside is pallid, with a dusky suffusion toward the sides of the hyponotum. Upper tentacles dark blue-grey. Stomach not covered by the liver, but rather broadly exposed; course and form of the intestine quite normal, the last loop traversing a little less than a semicircle; filiform glands extremely long (20 mm.), twisted right round the gut, the fully developed ones only five in number, but several other short ones at the base of the bundle.

The sole does not project beyond the end of the body. An apparently distinct species, best known by its narrow form and very long filiform glands. It extends the distribution of the genus about fifteen degrees north in Eastern Africa.

Collected by the Nile, above Khartoum, by Mr. Harold H. King, of the Wellcome Research Laboratories, Khartoum.

NOTES.

ERRATA.—"Land Mollusca of Aldabra," in the October number. Line 4, "Conoro" is a typographical error for "Comoro." Quotation marks should be placed at the beginning of the sentence of line 7, also of each succeeding paragraph and the finish of article.—MAXWELL SMITH.

THE NAUTILUS.

VOL. XXIII. FEBRUARY, 1910. No. 9

A COLLECTING EXCURSION NORTH OF THE GRAND CANYON OF THE COLORADO.

In August last Messrs. J. H. Ferriss and L. E. Daniels set out to extend the work begun by Ferriss and Pilsbry in 1906. From Bass' Camp they crossed the Grand Canyon of the Colorado; scaled the northern rim, explored and collected in the Kaibab and Kanab plateaux, finally reaching Kanab, in southwestern Utah. Beyond the Grand Canyon, where we had worked in 1906, this was all a virgin field conchologically. An account of their journey is here extracted from a letter received from Mr. Ferriss.

Friend Pilsbry:

The Arizona expedition of 1909 is in the offing, to use a nautical term. We felt worried until your letter was found at the end of the trip. There was some danger of getting lost in the desert in an effort to find us. A settler with a team from Mt. Trumbull a day ahead of us was three days without water and just about all in when he reached the Pipe Springs. We supposed you would come the back-door route by Salt Lake so that in coming or going you would pick up the Oreohelix found by Hemphill.

Unexpectedly we made the trip to Mt. Trumbull via Fredonia, Arizona and Kanab, Utah, and thus found the guide we had picked out watching for you. On a side trip I went up to the lakes in the mouth of caves along the Kanab Wash north of these villages, and from what I saw and heard it will be an interesting conchological trip along the mountains all the way to Salt Lake. It was at these cave lakes that I found *Succinea hawkinsi* of British Columbia. We heard of Oreohelix with a long nose but did not find them.

There must be a difference in the anatomy of different lots of *Succinea avara* sent in. We found it plentiful on the ant hills in the Antelope valley, a desert as dry as the St. Simon valley. Again on the hottest and dryest of mountain rock at the Hurricane Fault. Still again we found it with *Oreohelix* at the Big Springs in the Kaibab Mountains living in as moist a situation as we find *Polygyra multilineata*. These were of a different color, larger and more corpulent.

After this I hope to go into strange countries with U. S. Geological folios in addition to the contour maps, for the whole Mt. Trumbull country was of lava formation, barren of shells except the small truck. We need limestone and shelter in our business. The Hurricane Fault had lime but no shelter and was equally as barren. This Trumbull side-trip took half of our time and cost a lot of money, but we enjoyed it. We love the Mormons, at least their cooking, and I am now physically perfect until next August.

I will send you a map marking our collecting stations. There were 113 of these. Oreohelix was found at perhaps 100 stations and 80 of these are unlike any other colony in color, size or architecture, while each colony is reasonably uniform individually. We had a theory when we left the Two Springs canyon that the shells were small and dark in the higher altitudes and that they grew larger in a regular ratio as we passed to the lower levels, but in the Warm Springs Canyon the shells were largest at the upper stations and smaller at the lower. In the Snake Gulch they were smallest at the midway stations, and in Quaking Asp canyon it was a skip about between large and small. At Castle Springs, heavily shaded and in elderberry bushes, we found the largest. At Big Springs, facing the sun, moisture abundant, they were small with many albinos. Thus as to elevation, shade, moisture, soil or food we have no theory except like old-time chickens they may just happen to be large, small and middling, ring-banded, streaked or speckled. Our largest measured 30 mm. diam. and our smallest 8 mm. In the Huachucas the colonies of *Oreohelix* are of mixed forms, but the Kaibab shells are of one kind in each colony, with occasional albinos. Some of the colonies apparently divided their rock slide territory into families, designated by size or color. In one instance passing around the point of a rock, less than one hundred feet, and good traveling for snails, the colony on one side was as large again in size as those upon

the opposite side. Our prettiest shells are pure white with a green, transparent band, like Clapp's Maine find of *Helix hortensis*.

The Sonorellas were in small colonies and hard to dig. We did not find any after leaving the north rim of the Grand Canyon and the Kaibab-Powell Saddle. Powell and Kaibab plateaus are fairly level and I have never seen anything more beautiful in timber landscapes. Powell is covered with a heavy growth of large yellow pine. In the Kaibab plateau or mountains, better known in Arizona as Buckskin Mountains, blue spruce and quaking aspen with the pine lend variety to the scenery. No landscape artist in Fairmount Park could manage the grouping better than we saw it in a day and a half journey by donkey, down the Snake Gulch (known as Shinamo Canyon on the U. S. maps.)

We camped with E. W. Nelson and C. Birdsi of the biological survey of the U. S. Agricultural Department at Mt. Trumbull. Here we learned that the tufted-eared squirrel of the Kaibabs was *Sciurus alberti* var. *kaibabensis*. It is the largest American squirrel, black as silk with a white tail. A chattering chickaree is black throughout, and there are four chipmunks and a blue grouse. Deer were about as common as cattle, and as tame, for the Kaibabs are in a game preserve. The plains about Trumbull are populated with wild horses and these are common game, to be had for the catching.

Again I visited the Grotto [on White Creek, a branch of the Grand Canyon] and took more of the maidenhair fern. It seems to be a new species, and it so happens I am working at that group. The Grotto and creek have been filling up with gravel since you and I were there together. They are quite changed since our visit three years ago. From the Grotto, White creek keeps to the north and Muav to the west; heading in the saddle between Kaibab and Powell plateaus. So when you and I slept by the fire and found the colony of Sonorellas we were in the Muav Wash and more than half way to the north rim of the Grand Canyon. About a mile above our sleeping place, there is a fine trout stream (without fish) and cliffs a thousand feet high, with Sonorellas.

There were no mice this time at our old thousand-mouse camp on Shinamo creek.[1] We saw but two on the whole trip. Thus John had a fine orchard with leaves on the trees this time, also melons, sweet potatoes and common things in plenty. Their asbestos mine

[1] On the north side of the Grand Canyon, near the river.

is very promising but it is a long road to consumption for the copper. We found a half million dollar copper smelter in the Kaibabs and a saw mill, but only two men in the mountains besides the foresters, and these were at the saw mill. They had a wagon road to Fredonia. In fact you can wagon from the top of the Kaibab saddle to Fredonia or most any other place in that region. An auto was driven through from Salt Lake while we were there to Bright Angel, on the north side of the canyon across from the hotel. But from Bass Station to Trumbull, 125 miles, there will be no inhabitants through the winter, except Bass and John working out assessments on new mines.

Yours Truly,

JAS. H. FERRISS.

A NEW VARIETY OF LYMNAEA STAGNALIS.

BY FRANK C. BAKER.

LYMNÆA STAGNALIS LILLIANÆ var. nov.

Lymnæa stagnalis var., DANIELS, NAUTILUS XXII, p. 120 (1909).

Lymnæa stagnalis var., WALKER, Ann. Rep. Mich. Geol. Surv., 1908, 289, figure 63, No. 1 (1909).

Shell elongate-ovate, with short spire and elongated, narrow aperture, which is typically longer than the spire; whorls flattened, elongated, very flat-sided and sloping, especially the body whorl which is cylindrical; spire sharply acuminated; whorls $5\frac{1}{2}$ to 6; body whorl elongated, flattened, roundly shouldered; aperture long and narrow, slightly expanded; axis strongly gyrate; umbilical region with a very minute, narrow chink; sculpture and nuclear whorls as in *stagnalis appressa.*

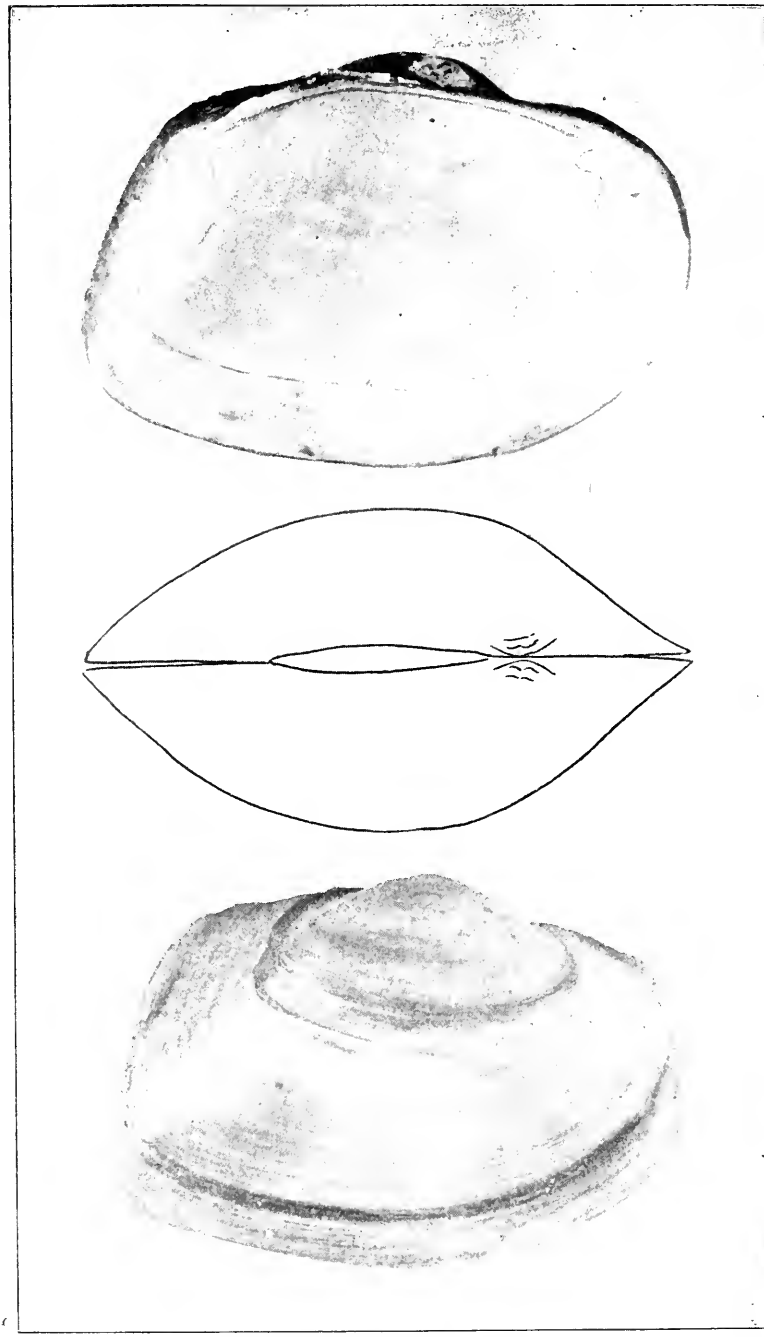
Length, 42.00; width, 22.00; aperture length, 26.00; width, 13.00 mill.

Length, 40.00; width, 19.50; aperture length, 23.50; width, 11.75 mill.

Length, 39.00; width, 20.00; aperture length, 24.50; width, 11.00 mill.

Length, 37.50; width, 19.50; aperture length, 23.75; width, 12.00 mill.

Length, 40.00; width, 19.00; aperture length, 23.25; width, 11.50 mill.



ANODONTA DAKOTA FRIERSON.

Length, 28.00; width, 13.00; aperture length, 17.50; width 8.50 mill.

Types: Chicago Academy of Sciences, five specimens, No. 24554.

Type Locality: Tomahawk Lake, Oneida County, Wisconsin.

Range: Michigan and Wisconsin north of the 45th parallel of north latitude.

Records.—Michigan: Isle Royale; various localities. (Adams; Gleason; Walker).

Wisconsin: Quynoch Point, Eagle Bay, and other portions of Tomahawk Lake, Oneida County (Baker).

Ecology: L. s. lillianæ is typically an inhabitant of sandy shores, in shallow water, where it is subjected to heavy wave action, only once was a specimen found in a still-water habitat, and this instance was undoubtedly caused by drifting from its normal habitat. When any number of specimens were found, the habitat was invariably an exposed beach. Associated with *lillianæ* were *Galba emarginata* and *Planorbis binneyi*. Individuals were observed crawling over the sandy beach or attached to water-soaked logs or other shore debris.

The animal of this race exhibits two color phases, one bright yellow and the other black or grayish-black. No cause for this color dimorphism was apparent. It is not protective as both forms occupy the same area of white sandy beach.

(*To be continued.*)

DESCRIPTION OF A NEW SPECIES OF ANODONTA.

BY L. S. FRIERSON.

ANODONTA DAKOTA, n. sp. Plate X.

Shell elliptically rounded before (slightly cut away below) dorsal line nearly straight, base slightly curved. Posterior nearly straight, making the shell trapezoidal in outline. Epidermis straw yellow, with dark bands marking the rest periods.

Umbonal ridge angular, beaks not high, with double loop sculpture, as in *Ano. grandis*, Say.

Umbos inflated, greatest diameter of shell about $\frac{1}{3}$ from beak to base.

Length, 3; height, 1.8; diameter 1.6 (inches).

Length 76, height 51, diameter 40 mm.

Found by Mr. W. H. Over, at Ulvers Point, Clear Lake, Deuel Co., South Dakota, July 1, 1909.

To launch a new *Anodonta* is a perilous undertaking, but in this instance the novelty of the form is unmistakable. The beaks ally the shell, of course, to *Anodonta grandis*, Say. It is nearest to that form called by Mr. Anthony *A. subgibbosa* (and especially to the figure of this species shown in the Conchologia Iconica, which is much more characteristic than the figure in the American Journal of Conchology). From any form of *Ano. grandis* it differs in being more cylindrical, *i. e.*, in lacking the swelling "amidship" so often shown by *A. grandis*; in being rayless (so far as known), but especially by having its posterior point not elevated above the basal line, and by the marked truncation posteriorly, which truncation is as marked as in *Morgaritana morginata* Say, and the straight posterior, and the resulting quadrilateral aspect of the shell. It is more quadrate than *Anodonta doliaris*, Lea. The lack of any *obliquity* is remarkable. Mr. Over also sent me from the same lake examples of *Anodonta grandis*, Say, and the facies of our species was strikingly dissimilar.

A NEW SYSTEM OF THE UNIONIDAE.

BY DR. A. E. ORTMANN, CARNEGIE MUSEUM, PITTSBURGH, PA.

Since October, '09 the present writer has been engaged in the study of the anatomy of the soft parts of the *Unionidæ* of Pennsylvania, collected during the last four years. The material at hand being very rich, it was possible to make out the structure of most of our species, and the results obtained are rather satisfactory, and are apt to furnish new principles for the systematic arrangement of the species.

Simpson (Pr. U. S. Nat. Mus. 22, '00). in his system, has indicated some of the essential principles of classification, in fact, the first pointed out *the* most important feature, the shape of the *marsupium*, Yet this system must be changed considerably, if it is to represent the natural affinities. This is due chiefly to the fact, that Simpson. on the one hand, had rather insufficient material, and on the other, that he did not go into microscopic detail.

Some corrections of Simpson's system have been advocated by Sterki (Amer. Naturalist 37, '03 p. 103 ff.), and, generally, I find that these are well supported. Yet there are other differentiations in structure, which have been overlooked hitherto, and which are of prime systematic value.

The most important (and gratifying) result of my investigations is, *that the gills or parts of gills, which serve as marsupium during the breeding season, are permanently differentiated in their anatomical structure from those gills (or parts of gills), which never serve as marsupium.* Thus it is possible to recognize the type of marsupium of any species, if only sterile females are at hand.

My investigation will be published in full in the "Memoirs of the Carnegie Museum," amply illustrated by figures of the structures discussed. Although I am not quite done yet, and although I hope to secure additional material next summer, I think it advisable to publish my preliminary results as soon as possible, in order to direct the attention of the collectors to those genera, which I have not been able to investigate. It would be desirable for anybody, who intends to collect *Unionidæ* next summer, to make up his mind from the beginning, that shells without the soft parts are not the thing that is wanted, but that the soft parts, at least of some specimens, should always be preserved in alcohol.

The family *Unionidæ*, in Simpson's sense (l. c., p. 514, 515, 516), is accepted. Simpson divides it into two subfamilies, of which one, *Hyriinæ* (= *Hyrianæ* Swains., Simpson, pp. 515 and 806), is extralimital, and which cannot be discussed at present. The other is the *Unioninæ* Swains. All our North American forms belong to the latter. But I think they should be divided into four groups, which I would designate as subfamilies. Thus, disregarding the *Hyriinæ*, the *Unionidæ* are divided into four subfamilies, as shown below.

In the following I shall give a systematic arrangement of the Pennsylvanian species. Of the characters, I have given the most important ones of the soft parts for the subfamilies, and for the genera where necessary. It is not my intention to go into any detail, since further investigations may possibly necessitate minor changes in the arrangement of the genera. Some notes are appended at the end, in order to explain the most striking changes introduced here.

1. Subfamily: MARGARITANINÆ.

Gills *without well-defined water tubes;* connections of the two laminæ by irregularly scattered prominences, but not by septa. (This is a most remarkable character, in which *Margaritana* differs from all other genera.) Supra-anal opening not separated from the anal opening. Diaphragm (posterior part of gills, separating anal and branchial openings) of peculiar shape: *the outer lamina of the outer gill is free from the mantle for a considerable distance.* Inner lamina of inner gills free from the abdominal sac. No papillæ on edge of mantle in front of branchial opening. (Marsupium and glochidia unknown to the writer.)

Genus and species: *Margaritana margaritifera* (L.).

2. Subfamily: UNIONINÆ.

Gills with rather *well-defined water tubes*, the latter formed by septa, which run the whole width of the gill, parallel to the gill-filaments. Supra-anal opening not separated or (generally) separated from the anal, the closed part rather short. Diaphragm normal (*i. e.*, outer lamina of outer gills connected with the mantle to their posterior end). Inner lamina of inner gills always free from abdominal sac. No papillæ on mantle edge in front of branchial opening. *Marsupium formed by both gills or only by the outer gill; edge of marsupium always sharp* (not distending). Water tubes not divided in the gravid female. *Glochidia* semioval or semicircular, without spine.

1. Genus: *Quadrula* (Raf.) Ag. (restr.). Both gills (inner and outer) serving as marsupium.

   Species: *subrotunda* (Lea) [and var. *kirtlandiana* (Lea)]—*rubiginosa* (Lea) [and var. *trigona* (Lea)]—*pustulosa* (Lea)—*metanevra* (Raf.)—*cylindrica* (Say)—*tritogonia* (Ortm)[1]—*undulata* (Barn.).

2. Genus: *Rotundaria* Raf. (as subgenus). Outer gills only serving as marsupium. Supra-anal opening not separated from the anal. Also with peculiar shell characters.

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[1] *Quadrula tritogonia* Ortm. = *Tritogonia tuberculata* (Barn.) of Simpson. The nomenclature of this species remains to be settled. Since *Qu. tuberculata* (Raf.) is now removed from the genus *Quadrula*, the specific name *tuberculata* might become available. *Qu. lachrymosa* (Lea) probably is also a true *Quadrula*.

Species: *tuberculata* Raf.

3. Genus: *Pleurobema* (Raf.) Ag. (enlarged). Outer gills serving as marsupium. Supra-anal separated from the anal.

Species: *cooperiana* (Lea)[1]—*œsopus* (Green).
obliqua (Lam.) [including the form *pyramidata* (Lea) and the var. *coccinea* (Conr.).[2]
clava (Lam.).

4. Genus: *Unio* Retz.[3]

Species: *crassidens* (Lam.)—*gibbosus* (Barn.)—*complanatus* (Dillw.)—*productus* (Conr.) (Fulton Co., Pa.).

3. Subfamily: ANODONTINÆ.

Water-tubes similar to those of the *Unioninæ*, only less regular at base of gills, chiefly so in the male. Supra-anal opening well separated from the anal; sometimes the connection of the mantle margins is very long. Diaphragm normal. Inner lamina of inner gills generally free from the abdominal sac, sometimes with the tendency to become connected with it, or entirely connected. No papillæ on mantle edge in front of branchial opening. *Marsupium formed by the outer gills; edge of marsupium, when charged, distending, the thickened tissue forming the edge stretching out in a direction transversal to the gills*, but not bulging out beyond the edge of the gill (or only slightly so). Water-tubes in the gravid female *divided longitudinally into three tubes*, one lying toward each face of the gill, the third in the middle; only the latter contains eggs or embryos, and is much larger than the outer tubes. This division into three parts is not present in the sterile female. *Glochidia* subtriangular, with one spine at the tip.

1. Genus: *Alasmidonta* Say.[4]

[1] *Pleurobema cooperiana* (Lea) (= *Qu. cooperiana* of Simpson) surely groups with *Pl. œsopus*.

[2] *Pl. obliqua*, *pyramidata* [and also *plena* (Lea)] form a natural group by themselves, and probably are one and the same species. *P. pyramidata* is only an extreme variation of *P. obliqua*, with which it occurs, while *coccinea* is a good ecological variety, which, however, runs into *obliqua* at certain localities.

[3] The characters of the soft parts of *Unio* are practically identical with those of *Pleurobema*. A distinction is possible only by shell characters.

[4] The genera of the *Anodontinæ* are distinguished chiefly by shell characters, but it seems as if *Alasmidonta* and *Strophitus* are more closely allied to each other, and then again *Symphynota*, *Anodontoides* and *Anodonta*.

Species: *heterodon* (Lea)—*marginata* (Say) [and var. *varicosa* (Lam.)]—*undulata* (Say).[1]

2. Genus: *Strophitus* Raf.[2]
   Species: *undulatus* (Say) [= *edentulus* (Say)].
3. Genus: *Symphynota* Lea.
   Species: *compressa* (Lea)—*viridis* (Conr.).[3]
   costata (Raf.)—*complanata* (Barn.).
4. Genus: *Anodontoides* Simps.
   Species: *ferussacianus* (Lea) (and var. *subcylindraceus* (Lea).
5. Genus: *Anodonta* Brug.
   Species: *cataracta* Say.—*grandis* Say (with several varieties) *imbecillis* (Say.)[4]

4. Subfamily: LAMPSILINÆ.

Water tubes similar to those of the *Unioninæ*. Supra-anal opening separated from the anal, rarely entirely closed. Diaphragm normal. Inner lamina of inner gills rarely more or less free from abdominal sac, generally entirely connected with it. Mantle edge in front of branchial opening crenulated, *papillose, or with a peculiar flap. Marsupium formed by the outer gill, or (mostly) by the posterior part of the outer gill* (sometimes only a section of the latter is used for the marsupium). *Edge of marsupium, when charged, rounded, distended and bulging out beyond the ends of the branchial filaments.* Water tubes in the gravid female simple. *Glochidia* generally of the type of the *Unioninæ*, rarely different, and rectangular with two spines.

1. Genus: *Ptychobranchus* Simps.[5]
   Species: *phaseolus* (Hildr.)

[1] *Alasmid. heterodon* stands by itself, while *marginata* and *undulata* are more closely related.

[2] The marsupium of *Strophitus* is very peculiar and complex, and cannot be explained in a few words and without figures. The discharge of the "placentæ" ("ovisacs" of Simpson) is *not* through the walls of the gills, as Simpson indicates (l. c., p. 616).

[3] *Symphynota compressa* and *viridis* are *hermaphrodites!*

[4] As already Sterki has shown, *Anodonta imbecillis* is a *hermaphrodite*, which I am able to confirm. I know another species of *Anodonta*, from Texas, which is also hermaphroditic; it groups with *imbecillis*, and belongs possibly under *A. henryana* Lea (or may be a new species).

[5] The peculiar character of the marsupium of *Ptychobranchus* is well known; this form reveals what is essential in the *Lampsilis*-type of marsupium. The genus *Cyprogenia* Ag., which I had no chance to investigate, very likely should follow after *Ptychobranchus*.

2. Genera: *Obliquaria* (Raf.) Simps.—*Plagiola* (Raf.) Ag.—*Obovaria* (Raf.)[1]
   Species: *Obliquaria reflexa* Raf.
   Plagiola securis (Lea)—*elegans* (Lea).
   Obovaria retusa (Lam.)—*circulus* (Lea)—*ellipsis* (Lea).
   Obovaria ligamentina (Lam.)[2]
3. Genus: *Proptera* Raf.[3]
   Species: *gracilis* (Barn.)—*alata* (Say.
4. Genus: *Carunculina* Simps. (subgen.)
   Species: *parva* (Barn.)[4]
5. Genus: *Micromya* (Ag.) Simps.
   Species: *fabalis* (Lea.)[5]
6. Genus. *Lampsilis* Raf. (restr.)[6]
   Species: *iris* (Lea)—*nasuta* (San)—*recta* (Lam.)[7]
   luteola (Lam.)—*radiata*(Gmel.)—*orbiculata* (Hildr.)[8]

[1] These three genera are practically identical with regard to their anatomy, only *Obliquaria* is distinguished by the marsupium consisting only of a few ovisacs. They may be distinguished by shell characters, which, however, are hard to define. All the species enumerated here are characterized by the *absence of papillæ or flaps on the mantle edge* in front of the branchial opening. A final arrangement of the genera must be left for the future.

[2] *Obovaria ligamentina* = *Lampsilis ligamentina*. This species undoubtedly belongs into this group, and *not* with the true *Lampsilis*.

[3] *Proptera*, as defined by Sterki. *P. alata* is distinguished by its peculiar glochidia (rectangular, with two spines). But *P. gracilis*, which agrees in all other respects, has different glochidia; they are of the normal *Lampsilis*-shape, *but much smaller*.

[4] *Car. parva* has the inner lamina of the inner gills not connected with the abdominal sac, and the supra-anal opening is entirely closed; for the rest it resembles the *iris*-type of *Lampsilis*.

[5] *Micromya fabalis* agrees well with the *iris*-type of *Lampsilis*, but the inner lamella of the inner gill is partly free from the abdominal sac. Both *Carunculina* and *Micromya* form a transition from the more primitive forms to the typical *Lampsilis*. Further study possibly will throw more light upon these forms.

[6] *Lampsilis* is characterized by the development of peculiar structures on the mantle edge. The first group has papillæ, the second a flap.

[7] Also *Lampsilis vibex nigrina* (Lea) from Florida and *L. anodontoides* (Lea) from Texas have been investigated, and prove to belong to this group.

[8] *L. orbiculata* is not at all related to *L. ligamentina*, as Simpson thinks, but it belongs to the *ventricosa* group of *Lampsilis*, for it has a well-developed flap on the mantle edge.

cariosa(Say)—*multiradiata*(Lea)—*ventricossa*(Barn.) and var. *ovata* (Say).

7. Genus: *Truncilla* Raf.[1]
   Species: *triquetra* Raf.—*perplexa rangiana* (Lea).

NOTES AND NEWS.

The Wendell Phillips High School, Chicago, in its regular Zoology work is doing things unique with the mollusca. Each pupil is required to make a "cigar box" collection of shells. These are fixed up nicely and covered with glass. The specimens are named on inside of lid and an exhibition takes place to which parents and friends are invited. This year over 200 boxes and 8000 specimens were exhibited.

The students under the direction of Mr. E. E. Hand, the teacher are urged to make a thorough study of their own region and in cooperation with the Agassiz Association are arranging for exchanges with high schools and individual collectors all over the world. Anyone interested is invited to correspond.—E. E. Hand.

It is with sorrow we record the death of Mr. John Ford, at his home in Philadelphia, on January 10, 1910. An obituary will appear in March number.

We also regret to announce the death of Dr. John H. Britts of Clinton, Missouri, which occurred November 14, 1909.

Lymnæa cubensis aspirans, n. subsp. The shell differs from *L. cubensis* by its much longer spire of very convex whorls. Length 12, diam. 6, length of aperture 6 mm.; whorls 6. Barbadoes. Types No. 85455 A. N. S. P. This is not *Limnæa barbadensis* Sowerby, Conch. Icon., xviii, pl. 14, f. 100. I have seen no Antillean species resembling that figure.—H. A. Pilsbry.

We learn with regret of the death of Dr. Kakichi Mitsukuri, the eminent Japanese zoölogist, on September 16.

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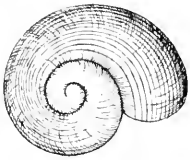
[1] Shell characters peculiar, and also mantle edge, and in some respects also the marsupium. The two species differ considerably, and the two subgenera of Simpson (*Truncilla* and *Pilea*) should perhaps be elevated to the rank of genera.



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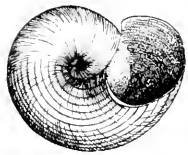

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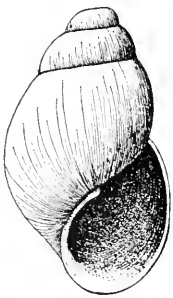

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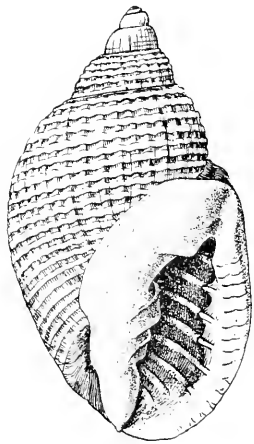

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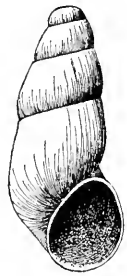

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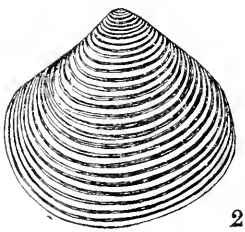

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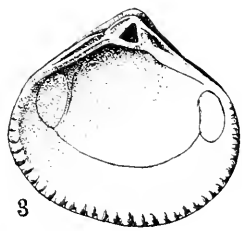

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BARTSCH: NORTHWESTERN MARINE SHELLS.
ALDRICH: NEW EOCENE FOSSILS.

THE NAUTILUS.

VOL. XXIII. MARCH, 1910. No. 10

A NEW FOSSIL MITRA FROM WEST FLORIDA, AND A NEW EOCENE ASTARTE.

BY T. H. ALDRICH.

MITRA (CHRYSAME) WALTONENSIS, n. sp. Pl. XI, fig. 1.

Shell rather solid, thick; apex scarcely pointed. Whorls six, three smooth, balance cancellated and shouldered, suture deep; varices near the aperture predominating over the spirals and appressed to the suture. Aperture with strong outer lip which is serrated on its outer edge and showing seven or eight strong lirations within; inner lip curved and covered with a strong enamel which spreads over part of the body whorl, two strong quadrangular folds on the lower central part and a pointed tooth near the posterior part of the aperture, base rounded, shell slightly umbilicated.

Height, 16 mm.; breadth, 9 mm.; length of aperture, 9 mm.

Locality: Shoal River bed, West Florida. Oligocene of Dall.

Remarks.—This is another Pacific Ocean form that adds to the evidence of a channel between the two oceans during the Tertiary period.

ASTARTE NEWTONENSIS, n. sp. Pl. XI, figs. 2, 3.

Shell small, rounded, nearly equilateral; beaks small, lunule rather long, the concentric ribs dying down at the edge, but the lines of growth run over to the hinge line and do the same on the escutcheon also. Valves moderately convex, sculptured with numerous small subequal ribs, inner margins crenulate, hinge as in the figure.

Height, 6 mm.; length, $7\frac{1}{2}$ mm.

Locality: From the "Burrstone," near Beulah P. O., Newton County, Miss.

Remarks.—This little species is strikingly similar to the species named ASTARTE OPULENTORA Dall, but that is from the Pliocene of Mexico.

NOTES ON THE CLASSIFICATION OF THE TORNATELLINIDÆ.

BY HENRY A. PILSBRY.

The *Tornatellinidæ* are a group of small or minute land snails found on the islands in and around the Pacific. An illustrated monograph has been prepared for the "Manual of Conchology," but as its publication will be delayed until the appearance of the *Achatinellidæ*, a brief sketch of the classification is here published in advance.

These shells have some resemblance to *Achatinellidæ* and *Partulidæ* in shape, but differ from both families by having an entering parietal lamella. In at least two species this is absent through degeneration in the adult stage, and in some others it is much reduced. Some species of the section *Lamellina* undergo remarkable changes from youth to maturity, the adult stage being secondarily simplified. Young individuals should always be collected with adults, when possible.

Key to Genera and Minor Divisions.

I. Shell rather *solid*, glossy, bright or dark colored or variegated; axis imperforate, but usually superficially rimate in the adult stage. Genus AURICULELLA Pfr.

II. Shell thin, light brown or corneous, not polished.

a. Axis imperforate, slender, the columella more or less sinuous.

b. Shell globose-ovate; columella armed with an angular or bilobed vertical callus or plate, truncate or excavated below the prominence.

Genus ELASMIAS n. gen.

c. Spire of few (3 to 4½) whorls; columellar callus in form of a vertical, angular or bilobed plate.

Section *Elasmias.*

cc. Spire of 6 to 7 close whorls; columellar callus bilamellate, lamellæ long; palatal plicæ developed. Section *Lamellovum* n. sect.

bb. Shell oblong-conic or turrite, very thin; columella sigmoid or nearly straight, sometimes calloused or bearing lamellæ, not truncate or excavated at base. Genus TORNATELLINA Pfr.

c. Shell oblong-conic; whorls 5 to 7.

d. Aperture having a columellar and a parietal lamella and two palatal folds. Section *Tornatellina.*

dd. Aperture having columellar and a parietal lamella and more or less serrate, vertical, palatal ribs, at least in the neanic stage. Section *Lamellina* Pse.

ddd. No palatal armature at any stage; columella more or less sinuous, sometimes lamellate, whorls 5 to 6. Section *Lamellidea*, n. sect.

cc. Shell long-turrite, whorls 9 to 10. Section *Elasmatina* Petit.

aa. Axis umbilicate or perforate throughout; columella not sinuous or truncate. Genus TORNATELLIDES n. gen.

b. Columella unarmed at all stages of growth. Section *Tornatellides.*

bb. Columella bilamellate, at least in the young. Section *Tornatellaria*, n. sect.

Types of the Genera and Minor Groups.

Frickella Pfr. 1855, type *Achatinella amoena* Pfr.

Auriculella Pfr. 1855, type *A. auricula* (Fér.).

Elasmias Pils. 1910, type *Tornatellina aperta* Pease.

Lamellovum Pils. 1910, type *Tornatellina globosa* (Petit).

Tornatellina Pfr. 1842, type *Tornatellina clausa=bilamellata* (Anton).

Lamellina Pease 1860, type *Lamellina serrata* Pease.

Lamellidea Pils. 1910. type *Tornatellina peponum* (Gld.).

Elasmatina Petit 1843, type *E. subulata* Pet. = *T. turrita* (Anton).

Tornatellides[1] Pils. 1910, type *T. simplex* Pse.

Tornatellaria Pils. 1910, type *T. newcombi* Pfr.

Auriculella and *Tornatellaria* are restricted to the Hawaiian Islands. *Lamellovum* and *Elasmatina* to Rapa. The other groups have a wider range. *Lamellidea* and *Tornatellides* range from the Bonin, Luchu and Hawaiian Islands to New Zealand; *Elasmias* from the Japanese Oceanic Islands to Australia, while *Lamellina* does not go south farther than Micronesia and Polynesia. There are some New Caledonian species of *Tornatellina*, but the absence of records of *Tornatellinidæ* from the Solomons, New Hebrides and other Melanesian islands is remarkable, and must be due to these minute shells being overlooked. The family is represented by a solitary species in the Galápagos.

A CONCHOLOGICAL MUSEUM FOR JAPAN.

BY Y. HIRASE.

As I stated in the late issue of my paper I am going to establish a conchological museum in the near future and I hope I shall be able to contribute a little to this branch of study. Hon. S. Omori, Governor of Kyoto-Prefecture, Dr. H. Kinoshita, Ex-President of the Kyoto Imperial University, Dr. Y. Tanaka, a member of the House of Peers and two or three others of eminence promised to render assistance, if need be, and are in deep sympathy with my undertaking. I am well convinced that I shall be able to carry out my plan and attain my object, the establishment of a conchological museum.

For the building expenses of the museum, I rely for $5,000 upon the generosity of persons interested in science in foreign countries. It is not intended to ask contributions, but to issue sets of Japanese shells, the proceeds to be applied to the museum.

Each lot or set contains 500 species of Japanese shells, valued at $100. Many sets are prepared and can be sent as soon as I receive orders. As to the 500 species in each set, they shall be subject to selection. Let me hear the names of the species desired.

As already said, I do not wish for cash contributions to the museum.

[1] The term *Tornatellides* differs sufficiently in spelling and etymology from *Tornatelloides* Pfr.

Yet such donations as specimens of shells, shell fancy-work, books, papers and pamphlets which have descriptions or pictures of shells, etc., will heartily be welcomed. They shall be arranged in cases in the museum, carefully preserved and duly credited to the donors.

Kyoto, Japan.

A NEW VARIETY OF LYMNAEA STAGNALIS.

BY FRANK C. BAKER.

(*Concluded from page 113*).

Remarks: Lymnæa stagnalis lillianæ may be known by its short spire, long and narrow aperture, and compressed body-whorl. It was at first thought to be a form of *sanctaemariae*, but a comparison with that species shows it to be uniformly narrower with compressed body-whorl, and more acute spire. In sanctaemariae the body-whorl is always very rotund; the aperture is also roundly ovate, while in *lillianae* it is elongate-ovate. The musculature of the male organ is also quite different from sanctaemariae, and similar to that of appressa. *Lillianæ* differs from *appressa* in its short spire, flattened and compressed body-whorl and elongated aperture. It appears to be a distinguishable race of *L. stagnalis.*

No true *appressa* were found associated with this race in Tomahawk Lake. There were a few specimens with spires and aperture of equal length, showing clearly that the race is a modification of the *appressa* type, caused, doubtless, by a change of environment.

At Isle Royale, in Lake Superior, a form of stagnalis occurs which at first sight appears quite distinct. A number of individuals, however, approach very closely to var. *lillianæ* and they may be referred provisionally to this race. Judging from the material at hand, this is a transition form between *appressa* and *lillianæ*, representing, perhaps, one of the stages in the evolution of the race. The Isle Royale form "is characteristic of the quieter waters of the long, narrow harbors which are such a remarkable feature of the Island." (Walker). Typical *lillianæ* lives on a wave-beaten shore, and this precarious environment has caused the aperture to become enlarged to provide for the larger foot to enable it to retain its hold on submerged objects. The Isle Royale form, living in quieter water, has not developed the large aperture of the Tomahawk Lake shell.

The Tomahawk Lake shells vary to some extent, those inhabiting the quieter bays having a longer spire and a smaller aperture. These shells closely resemble the Isle Royale specimens and also clearly indicate relationship with *appressa*. Specimens referable to *appressa* were collected at one station in Tomahawk Lake, the habitat being marshy in character. Some pathologic forms occur in the Wisconsin shells, the abnormalities being confined principally to the last whorl and aperture. Specimens from Lake Harriet, Minnesota, collected by Mr. L. E. Daniels, are also referable to this race.

In the course of time this race will probably assume specific characteristics. Its remarkable uniformity points to this.

The race is dedicated to my wife, who assisted in the discovery of the type specimens.

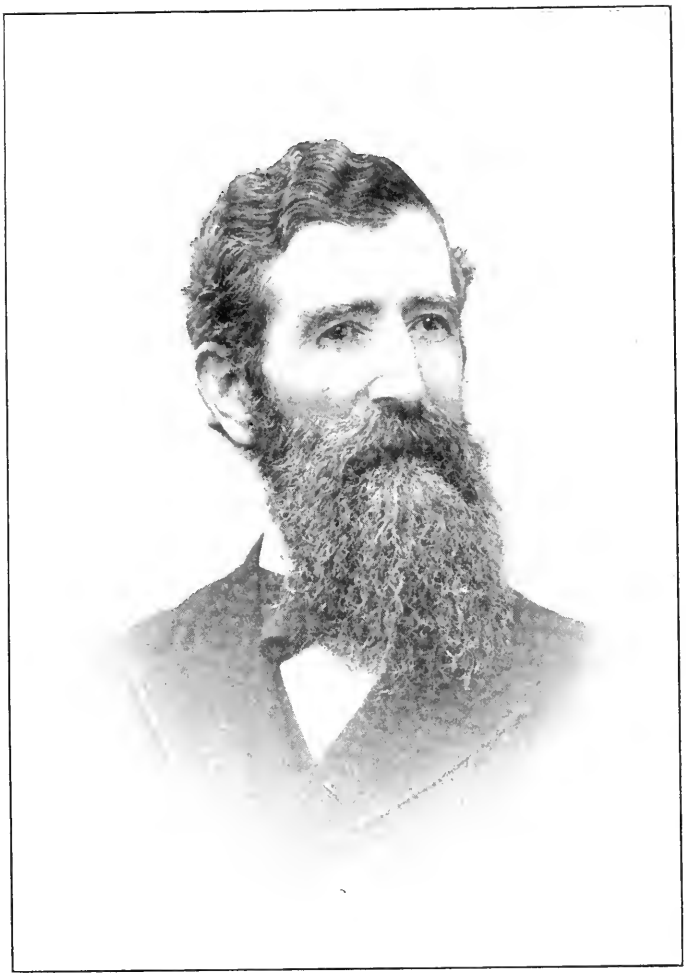
JOHN FORD.

John Ford was born in Chester, Pa., November 15, 1827, and died in Philadelphia, January 10, 1910. He was the son of Lewis H. and Esther (Ogden) Ford. His father died when he was about ten, and he was then practically compelled to shift for himself. He lived for about three years with a farmer in Delaware county, Pa., and then returned to Chester and entered a store. By untiring efforts the boy acquired a substantial education. His great love of nature and of music was a powerful incentive to self-cultivation.

On September 6th, 1847, Mr. Ford married Phoebe T. Flavill, of Chester, Pa. After living for a time in Paterson, N. J., and Shipman, Ill., he returned to Philadelphia in 1861, shortly after entering the Corn Exchange National Bank, where he was continuously employed until July, 1903, when, owing to a severe illness, he was compelled to retire from active business.

Mr. Ford was afflicted for many years by an ever-increasing deafness, which caused him to avoid social gatherings, and in his later years even scientific and musical meetings. Yet his warm and generous nature found pleasure in the company of a few intimate friends who shared his tastes.

Mr. Ford was an accomplished musician, many of his compositions having much merit. He especially excelled in melody. Many of his songs written over thirty years ago are still in favor. His first pub-



JOHN FORD.

lished song, "Will You Love Me when I'm Old?" had a tremendous and immediate success, and was by far the most popular of his compositions, though a number of those appearing later were deemed more worthy of consideration by his musical friends. Among these were "Watching and Waiting," "Daisy and I," "Away Down South," "Sweet Rosalie," and, best of all, "My Ships are Coming Back to Me"—a piece of deep poetic feeling.

As a young man, Ford was deeply interested in geology and mineralogy. A warm friend of Conrad, together they collected cretaceous fossils from the marl beds of New Jersey. With the late Theodore D. Rand he collected the minerals of Delaware and Chester counties. In the early sixties Ford met the Rev. Dr. E. R. Beadle. This acquaintance ripened into a warm friendship, and turned his attention from mineralogy to conchology. He often said—"It was Dr. Beadle who started me in the study of conchology, and who took all my minerals in exchange for shells." George W. Tryon, Jr., was also his warm friend, and their bond of friendship was strengthened by their love of music. Another true and life-long friend who survives him is Mr. Charles Morris, of Philadelphia.

Mr. Ford was elected a member of the Academy of Natural Sciences in 1866 and from that time until his illness in 1903, took an active interest in the Academy's magnificent collection of mollusks. He was especially interested in the local species and those of the New Jersey coast, making a special exhibition collection of both, for the Academy and also for the Wagner Free Institute of Science. Aside from the local shells he was also especially interested in the *Olividæ*. His long suites selected to show specific variation are unequaled in this country.

He also brought together a very fine collection of *Cypræidæ*, which although containing none of the great rarities, is notable for its large series illustrative of variation. His entire collection is remarkable for the perfection of the specimens and the great number of representive genera and species of all the principal faunal regions. He had little interest in fresh-water shells, aside from local species, or for the small or minute land snails, though he possessed a very fine series of exotic Helices and Bulimi, numbering many forms now very rare. The marine pelecypods such as *Veneridæ*, *Cardiidæ*, Pectens, etc., of his collection are especially fine.

Mr. Ford published 29 articles on conchological subjects, besides

a number of short notes, and a few articles dealing with paleontological and archaeological topics. His influence was largely personal. At the time of his greatest activity in conchology—1870 to 1895—he maintained a large correspondence, and was always ready to assist students with information from the rich library of the Academy. He was particularly helpful in naming specimens for conchologists who had no access to large collections or libraries, much of his leisure being given to this generous propaganda. Several species were named in his honor, among them *Donax fordi* Conrad, *Cerion fordi* P. & V., *Drymœus fordi* Pils. *Pleurodonte fordiana* Pils., *Phasianella fordiana* Pils., and others.

The portrait accompanying this sketch, is from his last photograph, taken when Mr. Ford was about sixty years of age.

He is survived by two sons William Henry and Albert W. Ford and two daughters Parthenia Ford and Mrs. Charles W. Johnson.

List of the Conchological Writings of John Ford.

1. Remarks on the Argonauta. Amer. Journ. of Conch., IV, 276, 1868.

2. Embryology of Fulgur, etc. Proc. Acad. Nat. Sci. Phila., 1884, p. 292.

3. A Day among the Mollusks. Conch. Exch., I, 21, 1886.

4. Helices in Fairmount Park, Philadelphia. Conch. Exch., II, 7, 1887.

5. Succinea obliqua Say in Fairmount Park, Philadelphia, with some Remarks regarding the Relationship of Succinea totteniana Lea. Conch. Exch., II, 23, 1887.

6. The Fresh-Water Mollusks of Fairmount Park. Conch. Exch., II, 39, 1887.

7. Some Remarks on the Migration of Mollusks. Conch. Exch., II, 71, 1887.

8. Description of a New Ocinebra. Proc. Acad. Nat. Sci. Phila., 1888, p. 188, fig.

9. Description of Helix (Trachia) dentoni. Nautilus, III, 17, 1889.

10. List of Shells of the New Jersey Coast South of Brigantine Island. Naut., III, 27, 1889.

11. Scalaria angulata in New Jersey. Naut., III, 52, 1889.

12. Remarks on Oliva inflata, O. irisans, and Other Species of Shells. Proc. Acad. Nat. Sci. Phila., 1889, p. 137.

13. Notes on Crepidula. Proc. Acad. Nat. Sci. Phila., 1889, p. 346.

14. On Crepidula glauca. Naut., III, 90, 1889.

15. A Few Last Words on Crepidula. Naut., III, 128, 1890.

16. A Glance at the Academy of Natural Sciences of Philadelphia. Naut., IV, 75, 1890.

17. Description of a New Anctus. Naut., IV, 81, 1890.

18. Some American Cannibals. Naut., IV, 85, 1890.

19. Description of a New Species of Helix [H. deaniana]. Proc. Acad. Nat. Sci. Phila., 1890, p. 188.

20. Description of New Species of Anctus and Oliva. Proc. Acad. Nat. Sci. Phila., 1891, p. 97, figs. 1, 3 and 4.

21. Some Remarks on New Jersey Coast Shells. Naut., VI, 25, 1892.

22. Description of a New Form of Cypraea. Naut., VI, 112, pl. 2, figs. 4, 5, 1893; VII, 39, 1893.

23. Remarks on a New Species of Cypraea. Proc. Acad. Nat. Sci. Phila., 1893. p. 310, fig.

24. Some Remarks Relative to Cypraea greegori. Naut., VII, 78, 1893.

25. A New Variety of Olivella. Naut., VIII, 103, pl. 2, fig. 14, 1895.

26. Notes on the Reported Extinction of the Genus Achatinella, and Marvelous Development of a Florida Fasciolaria. Naut., VIII, 123, 1895.

27. Some References to the Genus Oliva. Naut., X, 3, 1896.

28. Cypraea lynx deformed by Disease. Proc. Acad. Nat. Sci. Phila., 1897, p. 328, figs. 1–3.

29. Description of a New Species of Olivella. Naut., XII, 66, 1898.

H. A. P.

PUBLICATIONS RECEIVED.

Some New South American Land Shells (Smiths. Misc. Coll., vol. 52, p. 361–364, 1909). By Wm. H. Dall. *Pleurodonte tenaculum* and *Helicina heighwayana* are described from the Atrato River, Sierra Darien. The former seems closely related to *P. uncigera* Petit, having a remarkable hook within the basal lip, like that species. The altitude of the shell assigned (6.0 mm.) must be a typographical error. *Odontostomus branneri* is a new form from the province of Bahia, Brazil.

REPORT ON A COLLECTION OF SHELLS FROM PERU, WITH A SUMMARY OF THE LITTORAL MARINE MOLLUSCA OF THE PERUVIAN ZOOLOGICAL PROVINCE. By WILLIAM HEALEY DALL: Proc. U. S. N. M. 37, p. 147–294, Pls. 20–28, 1909.—Dealt with in his usual masterly way, this paper of Dr. Dall is one of the most notable contributions to the fauna of Western South America which has appeared for some years. Ostensibly but a report on the relatively small collection of shells collected by Dr. R. E. Coker, the scope of the paper has been widened, first by the addition of a valuable bibliography, and in later pages by the inclusion of a "List of Species Composing the Fauna," prefaced by several pages of the acute generalizations which we have now come to expect in nearly all the larger works of this author. The list of synonyms at the back is also a most useful feature.

As seems inevitable in a work of this scope a few minor errors and inconsistences have crept in, some of which it may be well to call to notice, as well as some of the more important changes in nomenclature which Dr. Dall has found it necessary to undertake.

The inaccuracies are as usual connected chiefly with the list of Cephalopods, which has apparently been compiled from the literature without any attempt at revision or the elimination of synonyms.

By the rules of nomenclature the family name *Philonexidæ* (used on p. 193) can have no standing and the creatures grouped under it must either be referred to the *Argonautidæ*, as most authors now maintain; or if segregated the name *Tremoctopodidæ* should probably be used. At any rate the only species here given under this group, *Tremoctopus minimus* Orb., is a synonym of *Argonauta hians* Sol.

On p. 194, *Bolitaena "microtyla"* is a misprint for *B. "microcotyla,"* and *Polypus "fontaineanus"* for *P. "fontanianus."* On p. 195 *Ommastrephus gigas* d'Orb. is now held the type of a distinct genus *Dosidicus* Steenstrup, 1857. Also *Steenstrupiola chilensis* Pfeffer is regarded by even its author as but the young stage of *Telcoteuthis platyptera* (d'Orb.) which is also listed on the following page. *Onychoteuthis brachyptera* Pfeffer may also be a synonym of this. *Tuonius schneehageni* Pfeffer (listed on p. 196) is a synonym of *Zygocranchia zygaena* (Verany) Hoyle, according to Pfeffer, but further specimens may indicate differently.

It is a pity that original figures of *Polypus fontanianus* and *Loligo*

gahi were not given instead of copies of the unsatisfactory drawings of d'Orbigny. (Plates 20–21).

The new species described are *Modiolus arciformis*, *Aligena cokeri*, *Diplodonta* (*Felaniella*) *artemidis*, *Xylotrya dryas* (an interesting form found burrowing in the *living* mangroves), *Bulimulus cokerianus*, *and Megatebennus cokeri*. *Acmaea orbignyi* Dall is a new name for *A. scutum* Orb. 1841 (not Esch (1833), and the commonly used terms *Anomia lampe* Gray, *Concholepas peruvianus* Lam., and *Crepidula unguiformis* Lam. must give way to *A. peruviana* Orb., *C. concholepas* Brug. and *C. crepidula* Linn. respectively.

The nomenclature of the faunal list presents the usual divergencies from that in common use which are already familiar to those who have read Dr. Dall's "Albatross" Report[1] or his notable memoir on the Oregon Miocene,[2] but there are still one or two points which seem difficult to understand, namely the retention of the family "*Aplysiidæ*" after the rejection of *Aplysia* for *Tethys:* the adoption of the family name *Turritidæ*[3] but not *Epitoniidæ;* of *Bullariidæ* and *Alectrionidæ* but not *Architectonicidæ*.

Murex elenensis Dall is a new name for *M. plicatus* Sowerby 1840 (non Gmelin 1791), *Thais peruensis* Dall replaces *Purpura peruviana* Eydoux and Souleyet 1852 (not Blainville, 1832), *Architectonica* (= *Solarium*) *nanum* (Koch) Philippi, 1853 (not Grateloup, 1838) becomes *A. kochii* Dall, *Fissurella aspera* Sowerby 1834 (not Eschscholtz, 1833) becomes *Fissuridea asperior* Dall, and *Chiton bipunctatus* Sowerby 1832 (not Fisher, 1808) is changed to *Tonicella* (*Mopaliella*) *stigmata* Dall. Among the *Pelecypoda*, *Pectunculus minor Orbigny* 1846 (not Lea 1833) becomes *Glycymeris chemnitzii* Dall, and *Donax aricana* Dall replaces *D. radiatus* Valenciennes, 1833 (not Gmelin 1791).

Another interesting point which may be observed in this connection with some propriety is that most writers on the mollusca of our Southeastern and Gulf States seem to have overlooked the fact that the *Siphonaria lineolata* of Orbigny, 1853 is preoccupied by Sowerby 1835. That name should therefore be restricted to the Chilian

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[1] Bull. Mus. Comp. Zool. xliii, No. 6, Oct., 1908.

[2] U. S. Geol. Surv. Prof. Pap., No. 59, 1909.

[3] The correct spelling is Turridæ as H. & A. Adams have shown. (Gen. Rec. Moll. II, p. 614, 1858).

species, while the Floridian form will then be known as *S. naufragum* Stearns. The chief synonymy of the two species is as follows:

SIPHONARIA LINEOLATA *Sowerby.*

1835 *Siphonaria lineolata* Sowerby, Proc. Zool. Soc., p. 6.

1856 *Siphonaria lineolata* Reeve, Conch. Icon., v. 9, Siphonaria, Pl. 3, fig. 11.

1909 *Siphonaria lineolata* Dall, Proc. U. S. N. M., v. 37, p. 205.

SIPHONARIA NAUFRAGUM *Stearns.*

1853 *Siphonaria lineolata* Orbigny (*non* Sowerby), Moll. Cuba, I, p. 232, Pl. XVII, fig. 13–15.

1872 *Siphonaria naufragum* Stearns, Proc. Bost. Soc. Nat. Hist., XV, p. 23.

1902 *Siphonaria lineolata* Dall; Proc. U. S. N. M. XXIV, p. 501, Pl. xxvii, fig. 10 and 13.

S. S. BERRY, Harvard University, Massachusetts.

THE OPISTHOBRANCHIATE MOLLUSCA OF THE BRANNER-AGASSIZ EXPEDITION TO BRAZIL, by Frank Mace MacFarland (Leland Stanford Junior University Publications No. 2, 1999).—The following species are described: *Tethys dactylomela* (Rang), *T. cerrina* Dall and Simpson, *Pleurobranchus agassizi*, *Discodoris branneri*, *D. vonihering*i, *Peltodoris greeleyi* and *Spurilla braziliana* nov. spp. The internal anatomy of all the species is fully described and illustrated with excellent figures. Professor MacFarland's excellent work on Opisthobranchs is making amends for the neglect of the group by American zoologists.—H. A. P.

NOTES.

ALBINO OLIVA ANGULATA.—We have recently received for examination a large and perfect specimen of *Oliva angulata* which is snow-white except for a small fleshy-brown stain on the callus at the posterior angle of the aperture and a rusty yellow stain in front of the callus. This albino, which may be called form *nivea*, is the first to be reported of this species, so far as we know. It seems to be an extremely infrequent variation. The specimen measures 83 mm. long, 42.5 wide. It is the property of the A. L. Hettrich Company, of San Francisco.—*H. A. Pilsbry.*

THE NAUTILUS.

VOL. XXIII. APRIL, 1910. No. 11

NEW SPECIES OF WEST AMERICAN SHELLS.

BY WILLIAM HEALEY DALL.

Several new shells have turned up lately in material received from the Pacific Coast, of which descriptions follow.

OLIVELLA (ANAZORA Duel. var. ?) PORTERI Dall.

Shell of about the form and size of the east American *O. jaspidea*, with very variable coloration; whorls about seven, spire acute with a very deep and narrow channeled suture not obscured by callus; surface of the whorls brilliantly polished, smooth, except for microscopic spiral close striation which is present on all, but more uniform on particular individuals; color pale olive, yellow, or whitish, with sharp angular axial brown lines superposed between the suture and the basal fasciole, sometimes forming a tent-like pattern and sometimes reduced to fine, close, more or less cloudy zigzags; a pale band in front of the suture, usually with vivid brown zigzag pointed forward, but sometimes plain, the brown lines when present broader and stronger than elsewhere; basal fasciole short, with a marginal and an adjacent narrow fold or plait anteriorly, lighter than the body, yellow or rich bluish purple; aperture narrow, simple, with a deep sutural sinus and a moderate parietal callus when mature. Height of shell 15; of aperture 9; max. diam. 6 mm.

From sandbars near the entrance to San Diego Harbor, and at Scammon Lagoon, Lower California, Miss J. M. Cooke. U. S. Nat. Mus. 209677. Named in honor of Captain George Porter who collected largely in the Gulf of California, and is supposed to have lost his life at Tiburon Island while on a collecting expedition.

The Scammon Lagoon specimens are more grayish than those from San Diego.

The nearest ally to this species is the shell figured by Marrat in the Thesaurus, plate 350, figure 419, under the name of *anazora* Duclos. This, judging by the figure, is a much smaller and somewhat stouter shell, with less distinct markings. The shell represented by figure 411 on the same plate is that identified by Dr. Carpenter and H. Cuming for the Smithsonian collection as *O. anazora* Duclos, though it is named *O. pulla* by Marrat. The heavy white callus on the body extending beyond the suture amply distinguishes it from *O. porteri*. I have not access to Duclos' original paper and hence cannot resolve the doubt as to which is Duclos' *anazora*.

The previously known Californian Olivellae were none of them of remarkable beauty, though some of the Gulf species are very attractive, but the present form is one of the prettiest shells of the coast. It may be that its range extends further north.

POMAULAX TURBANICUS n. sp.

Shell moderately large, rather thin, brilliantly pearly inside, covered with a reddish brown periostracum which becomes olivaceous on the base; form rather depressed, with turgid whorls, about six in all, the nucleus white, blunt, imperfect; base flattened, bordered by a sparsely nodulous carina; sculpture on the spire of slightly protractive, rounded, short, rather elevated riblets reaching about half way forward on the whorl from the suture (17 on the last whorl), ending in or barely separated from the same number of stout nodules at the periphery, with a marked sulcus separating them from a similar row of nodules on the margin of the base; base with four somewhat undulated spiral ridges separated by subequal interspaces, except the inner pair which are smaller and closer to each other; base imperforate, swollen at the base of the pillar; aperture ample; surface of the body erased, leaving visible pearly and white substance; the pillar arcuate, pearly; with no anterior prominence or tooth; outer lip and base simple, sharp; operculum white, rounded, shelly, with three partly gyrate, very prominent, granose, narrow ribs, the spaces between them excavated and smooth. Height of shell 37.5; of last whorl 30.0; of aperture (vertical) 21.5; max. diameter 41.0 mm.

U. S. Fish Commission station 2989, in 36 fathoms, coral, off Magdalena Bay, Lower California. U. S. Nat. Mus. 111242.

This is remarkably distinct from any of the previously known West American species.

PACHYPOMA MAGDALENA n. sp.

Shell conic, the sides of the spire flattened, the base flattened and somewhat concave, the basal margin compressed with a rounded and undulate edge; whorls about seven; the nucleus white, worn, sides covered by a scarlet periostracum which becomes darker on the base; sculpture of about thirty-four subequal protractive low riblets which are cut into elongate nodules by four spiral sulci, the peripheral nodules being longer and most prominent, giving the effect of a pre-sutural band; on the base are four subequal and subequally spaced spiral riblets, which in the young are sometimes nodulous or undulate; pillar pearly, space about it white or pearly, as is the interior of the aperture; the suture laid on the peripheral carina is undulate and in the young the base has a stellate appearance; the periostracum is strongly striate in the direction of growth. Height of shell 38; of last whorl 32; of aperture (vertical) 5; max. diameter 38 mm.

Station 2989, U. S. Fish Commission, with the preceding, U. S. Nat. Mus. 111239.

This is of the same general type as *P. inæquale* Martyn, but more delicate, smaller and more elegantly sculptured. The operculum is essentially like that of *P. inæquale*, which is not authentically reported south of the Santa Barbara Islands.

With these shells were taken two young specimens of *Uvanilla regina* Stearns, (unfortunately not containing the soft parts) thus adding another station to the known range of this excessively rare and beautiful species.

PACHYPOMA LITHOPHORUM n. sp.

Shell small, turbinate-conic, with about six moderately convex whorls, the basal margin being either bluntly rounded or undulately carinate; suture appressed, whorls covered with a reddish periostracum striated in harmony with the incremental lines; sculpture between the suture and periphery of nine closely and prominently beaded, alternately stronger and weaker spiral cords, with only linear interspaces; periphery in the type specimen with three finer threads; the base flattish, with six subequal, more or less undulate or beaded

cords with narrower interspaces; umbilical area imperforate, smooth, slightly excavated, white; pillar arcuate; smooth; aperture very oblique simple, pearly white within; operculum? Height of shell 32.5; of last whorl 20.5; of aperture (vertical) 11.5; max. diameter 36.5 mm.

U. S. Fish Commission station 2983, off Cerros Island, Lower California, in 58 fathoms, sand. U. S. Nat. Mus. 111241.

Of three dead specimens dredged, one had the periphery compressed and roundly keeled, and on the spire were some feeble indications of axial ribbing.

NEW MARINE SHELLS FROM THE NORTHWEST COAST OF AMERICA.

BY PAUL BARTSCH,[1]
Assistant Curator, U. S. National Museum.

In a collection of mollusks submitted to the U. S. National Museum for critical examination, by Dr. Fred. Baker of San Diego, California, collected by him on the Northwest Coast, are several new forms which are here described.

The types of these species have been kindly donated to the National Museum by Dr. Baker.

LEPTOGYRA ALASKANA new species. Pl. XI, figs. 4, 5, 6.

Shell minute, depressed helicoid. Nuclear whorls one and one-half, light yellow horn color, marked by faint incremental lines. A single post-nuclear turn follows which is bluish white, rather broad and gently, almost evenly curved from the well-impressed suture to the periphery. This whorl is marked by about twelve, fine, incised spiral lines between the suture and the periphery which are stronger toward the periphery than at the suture. Periphery of the last whorl rounded. Base broadly and deeply umbilicated, strongly arched, with a slender cord at the junction of the basal and parietal wall, surface of the base marked by incised lines which are equal in strength and number to those occuring upon the upper surface. Wall of the umbilicus almost flat, marked by faint spiral lines.

[1] Published by permission of the Secretary of the Smithsonian Institution.

Aperture very large, subcircular, posterior angle obtuse; outer lip thin; columella curved, somewhat expanded and thickened basally; parietal wall covered with a thin callus. Operculum thin, horny.

Twelve specimens of this species were collected by Dr. Fred. Baker at Port Graham, Alaska, four of which are in the U. S. National Museum, cat. no. 208433. One of these, the type, measures; greater diameter 0.85 mm., lesser diameter 0.7 mm., altitude 0.4 mm. The remaining eight specimens are in Dr. Baker's collection.

ALVANIA BAKERI, new species. Pl. XI, fig. 8.

Shell minute, bluish white. Nuclear whorls one and one-third, forming a moderately elevated spire. Upper half of the well-rounded nuclear whorls marked by about ten very fine closely spaced spiral striations, lower half marked by numerous closely spaced depressed elongate granules, each of which has the long axis decidedly protractively slanted; which lends to this part of the turn a finely blistered appearance. Post-nuclear whorls a little more than two, well rounded, separated by a strongly constricted suture marked by three strong rounded spiral keels of which the strongest is a little anterior to the posterior third between the sutures, while the anterior of the other two, which are of equal strength, is at the periphery and the third halfway between them. In addition to these keels the whorls are marked by fine incised spiral lines between the keels which are best developed on the well-rounded shoulder between the summit of the whorls and the strong keel below it. Base of the last whorl slightly protracted, well rounded, marked by two broad depressed spiral cords of which the basal one which is a little anterior to the middle is the broader. In addition to these are numerous exceedingly fine spiral striations. The axial sculpture of the entire spire and base consists of very fine incremental lines only. Aperture very broadly ovate, almost circular, peritreme continuous, outer lip thick within, beveled at the margin to form a sharp edge which is rendered slightly sinuous by the external spiral sculpture; columella strong and strongly curved, parietal wall of the aperture appressed to the preceding whorl.

The type, cat. no. 208445 U. S. N. M., was collected by Dr. Fred Baker at Port Graham, Alaska. It measures; length 1.4 mm., diameter 1.2 mm.

ONOBA ASSER, new species. Pl. XI, fig. 9.

Shell elongate conic, bluish white, semitranslucent. Nuclear whorls one and one-tenth, smooth, a little less elevated than the succeeding turns. Post-nuclear whorls very high between the sutures, overhanging, moderately rounded, appressed at the summit. The preceding whorl shines through the summit of the succeeding turn and gives this the appearance of having a double suture. Sutures well impressed. Periphery of the last whorl well rounded. Base moderately prolonged, well rounded. Entire surface of spire and base marked by closely placed exceedingly fine microscopic spiral striations. Aperture very broadly ovate, posterior angle obtuse, outer lip thin; peritreme complete.

The type, cat. no. 208434 U. S. N. M., was collected by Dr. Fred Baker at Fort Graham, Alaska. It has four and a half whorls and measures: length 2.2 mm., diameter .9 mm. This species is nearest related to *Onoba cerinella* Dall, from which it is distinguished by its lesser size and more delicate structure.

ODOSTOMIA (EVALEA) COOKEANA, new species. Pl. XI, fig. 7.

Shell elongate ovate, very narrowly umbilicated, yellowish white. Nuclear whorls very obliquely immersed in the first of the succeeding turns. Post-nuclear whorls very high between the sutures where they are very moderately rounded and marked by rather strong incremental lines and very numerous fine spiral striations. Periphery and base of the last whorl somewhat inflated, the latter strongly rounded and marked like the spire. Aperture large, oval; posterior angle acute; outer lip thin; columella decidedly oblique, quite strongly curved in the middle and somewhat reflected, provided with an oblique fold at its insertion which is strong within and tapers to a vanishing point at the free edge of the columella; parietal wall glazed with a thin callus.

Two specimens of this species were collected by Dr. Baker at Ellamar, Alaska. One of these, an immature specimen, furnished our description of the nucleus, the other, cat. no. 208427 U. S. N. M., gave the adult characters. The adult specimen has its nucleus badly eroded. The four remaining whorls measure: length 3.2 mm., diameter 2.0 mm. The young individual which is in Dr. Baker's collection has $3\frac{1}{2}$ whorls and measures: length 2.3 mm., diameter 1.4 mm.

Named for Miss J. M. Cooke of San Diego at the request of Dr. Baker.

THE SYSTEMATIC POSITION OF THE UNIONID-GENUS PARREYSIA.

BY A. E. ORTMANN.

In NAUTILUS, vol. 22, Feb. '09 p. 107, Frierson reports that in *Parreysia* all *four* gills serve as *marsupium* in the gravid female, a character which does not agree with Simpson's definition of the subfamily *Hyriinæ* (*Hyrianæ*). He concludes that, in this instance, we should not pay attention to the marsupial character, but should rely upon the radial sculpture of the beaks of the shell.

Recently I received a number of these *Parreysias* through the courtesy of Mr. Frierson, and I am much obliged to him for giving me the opportunity to examine them. I should call the species *Parreysia wynegungaensis* (Lea) although a number among them distinctly incline toward *P. corrugata* (Muell.) There are 30 of them, 13 males, 11 sterile, and 6 gravid females; none of the latter had glochidia, but only eggs in various stages of development. There was no sex differentiation whatever in the shells.

An examination of the soft parts revealed the fact, that not only all four gills are marsupial in the female, but that *the whole structure of the soft parts is absolutely like the North American Quadrula* (see: Ortmann, in: NAUTILUS, 23, Feb. '10 p. 116). The only, and unimportant, differences are, that the *supraanal opening* is rather widely separated from the anal, and that the *inner lamina of the inner gill* is entirely connected with the abdominal sac. For the rest, all other characters are like *Quadrula*, and the most prominent features are the following.

The inner edge of the anal opening is finely crenulated; that of the branchial opening is papillose, and rather well defined anteriorly; in front of the latter, there are fine crenulations on the inner mantle-edge for a short distance, but no special structures, such as papillæ or flaps. The gills are unequal, the outer considerably smaller than the inner. The diaphragm is normal, and the outer lamella of the outer gill is connected with the mantle to the posterior end. In the male, there are *well developed water tubes* in the gills, but they are rather wide, and the septa separating them are far apart. In both, the male and female, the edge of the inner gill possesses a longitudinal furrow, which is absent in the outer gill. In the female, *all four gills serve as marsupium*, and possess the structure of marsupial gills; the water tubes are narrow, and the septa are close together

(in the outer gill closer than in the inner). The septa show, in the sterile female, in both gills the characteristic folded epithelium. When gravid, all four gills swell but *only moderately, and the edges always remain sharp*, and do not possess the faculty of distending. The water tubes (ovisacs) *remain simple*, and in each of them the eggs form a subcylindrical, only slightly compressed, mass, a placenta, which, however, is not very solid, the mutual adhesion of the eggs being rather slight.

With the exception of the two features mentioned above, *Parreysia* is thus identical, in its anatomy, with *Quadrula*. If we add to these two differences the radial sculpture of the beaks, we would have good generic characters. But the genus, at any rate the species *wynegungaensis* which stands close to the type species of the genus, *corrugata*, should be removed from the subfamily *Hyriinæ*, and placed into the subfamily *Unioninæ* (NAUTILUS, 23, '10 p. 116), by the side of, and close to *Quadrula*. The definition of the *Unioninæ* should be slightly modified with regard to the supraanal opening and the inner lamina of the inner gills, so as to include *Parreysia*, but these modifications are irrelevant.

This, of course, means that I do not attribute any significance to the beak sculpture, but I think I am fully justified in this. If we make radial beak sculpture the prime character of the *Hyriinæ*, we would be compelled not only to unite the Afro-Asiatic forms, like *Parreysia*, with the South American *Hyriinæ*, which, I believe, is a great mistake, but we would also have to unite with the *Hyriinæ* a number of *living North American* shells. For we must not forget (and this is a fact generally overlooked) *that we have radial (zig-zag) beak sculpture in a number of species of Quadrula.* I name the following: *Quadrula (Rotundaria) tuberculata* (Raf.), *Qu. infucata* (Conr.) and *kleiniana* (Lea), *Qu. lachrymosa* (Lea), *forsheyi* (Lea), *speciosa* (Lea), *apiculata* (Say). Also in *Qu. cylindrica* (Say) traces may be seen. This zig-zag radial sculpture is best developed in the species first named; in the others it goes generally as "double-looped," but, in my opinion, the so-called "double-looped" sculpture is but the last remnant of the zig-zag sculpture.

Furthermore, *radial beak sculpture is a quite frequent feature in North American fossil Unionidæ* from the Mesozoic era. If we look at the beak sculpture of *Unio holmesianus* White (see: 3 Ann. Rep. U. S. Geol. Surv. '83, pl. 16, fig. 2–6) from the Laramie of southern

Wyoming; or at the beak sculpture of a number of species described by Whitfield from the Laramie of Montana (see: Bull. Amer. Mus., N. H. 19, '03 p. 483 and 23, '07 p. 623), we cannot deny, that we have here a beak sculpture corresponding very closely to the "radial" sculpture of certain Asiatic types. This is especially true in: *U. retusoides* Whitf. ('03, pl. 38, fig. 6), *U. browni* Whitf. (*ibid.* pl. 38, fig. 3), *U. percorrugatus* Whitf. (*ibid.* pl. 40, figs. 3, 4), and *U. pyramidatoides* Whitf. ('07, pl. 41, fig. 1), *U. letsoni* Whitf. (*ibid.* pl. 42, figs. 1–3). I have, fortunately, a number of specimens before me, coming from the same general region as Whitfield's material; they were collected for the Carnegie Museum at Hell Creek, Dawson Co., Montana, and show the beak sculpture beautifully in *U. retusoides*, *browni*, *pyramidatoides*, *letsoni*, and in addition it is distinctly seen in specimens of *U. verrucosiformis* Whitf. ('07, pl. 42, fig. 5). Some of these fossil forms undoubtedly are the ancestors of modern species, as is sometimes expressed in their names (but not always correctly; *pyramidatoides* has nothing to do with *Qu. pyramidata*, but belongs clearly to the *trigona*-type). Thus it is evident that many North American *Unionidæ once had radial beak sculpture, and some have preserved traces of it up to the present time.* This character probably once was more generally distributed, and remains rather well preserved in many old world forms (and also in South American groups), but in North America it has become more and more *obliterated.* Such a character, of course, although fit to indicate genetic relationship, is unfit to be used as a principle for classification.

The structure of the soft parts, which indicates close relationship between *Quadrula* and *Parreysia*, is much more reliable, in fact according to my experience, is *absolutely* reliable. In this connection it should be mentioned that in one of our gravid *Parreysias* only the outer gills were filled with eggs; but microscopical investigation showed that also the inner gills had the typical structure of the female marsupial gill, and that, in this instance, the specimen was just in the beginning of the period of gravidity, and the inner gills were *not yet* charged. Similar cases might sometimes lead to mistakes, if investigated only superficially.

Of course, we now stand before the task of redefining the subfamily *Hyriinæ* according to the South American typical representatives, and to investigate additional so-called *Hyriinæ* from Asia and

Africa. I hope to be able to contribute to the solution of the first question in the future, since the Carnegie Mrseum recently has received a good deal of alcoholic material of South American *Unionidæ*, which is waiting for identification and examination.

NEW SPECIES OF SPHAERIIDAE.

BY V. STERKI.

Sphærium lineatum, n. sp.

Mussel somewhat elongate, inequipartite, well inflated; beaks somewhat anterior, rather large, full, rounded, projecting over the hinge margin; superior and inferior margins moderately and regularly curved, anterior and posterior subtruncate-rounded, oblique; scutum and scutellum distinctly marked, narrow; surface dullish with a slight silky glass, with the concentric striæ (sulci) fine, sharp, crowded, regular, and several (3 or 4 to 7) strongly marked, dark lines of growth; color grayish-horn to reddish, the latter prevalent on the beaks and upper part of older specimens; shell rather thin, hinge slight, long, plate narrow; cardinal teeth small; slight, short, the right curved or angular, emarginate, its posterior part bifid, the left anterior rudimentary or wanting in some specimens;[1] ligament long, slight covered.

Long. 15.5, alt. 11.5, diam. 8. mill. (Turkey Lake).

Long. 14, alt. 10.5, diam. 8. 5 mill. (Wetherby).

Soft parts not seen.

Hab.: Turkey Lake, Kosciusko Co., Indiana, collected by Mr. L. E. Daniels, of the Indiana Geological Survey, in 1902.

A Sph. from Mountain Lake, Marquette Co., Michigan (Upper Peninsula), collected by Mr. Bryant Walker, in 1898, and sent for examination then, appeared to be of the same species. The mussel is somewhat smaller, with the beaks slightly more anterior, the inferior margin less curved and the infero-posterior angle somewhat more marked. These Sphæria, although well represented by good specimens of various stages of growth, and regarded as distinct, were shelved for years, in the hope of getting additional material. Lately Mr. Bryant Walker kindly sent me a lot of the Wetherby collection, which unfortunately has no label. Although such specimens should

[1] As occasionally found also in other species.

be considered worthless, the present ones were so manifestly of this same species that they may be regarded as a confirmation of it. They are rather like the Mountain Lake mussels in shape, but somewhat larger, and somewhat more inflated than the Turkey Lake form. It appears that the comparatively numerous, strong, mostly dark lines of growth and the fine (as compared with those of other species), sharp, crowded striæ are characteristic and, combined with surface appearance and color, let specimens be recognized at a glance.

Specimens of the type lot are in the Museum of the Geol. Survey of Indiana and in the Carnegie Museum, Pittsburgh (No. 5465 of my collection of *Sphæriidæ*), in the collection of Mr. Bryant Walker and the Mus. Acad. N. Sc. Phila.

PUBLICATIONS RECEIVED.

KEY TO THE GENERA OF GASTROPODA OF MICHIGAN. By H. BURRINGTON BAKER. (Reprint from the 11th Rept. Mich. Acad. Sci., 1909, pp. 134–140.)

DESCRIPTIONS OF NINE SPECIES OF ENNEA AND FIVE HELICOIDS FROM SOUTH AFRICA. By JAMES COSMO MELVILL and JOHN HENRY PONSONBY. (Ann. Mag. Nat. Hist., vol. 4, ser. 8, pp. 485–492, pl. 7, 1909.)

REPORT ON THE MARINE MOLLUSCA OBTAINED BY MR. J. STANLEY GARDNER, F. R. S., AMONG THE ISLANDS OF THE INDIAN OCEAN IN 1905. By JAMES COSMO MELVILL. (Trans. Linn. Soc. London, XIII, pp. 65–138, pl. 5, 1909.) About 170 species are recorded of which 15 are new to science.

MOLLUSCA FROM THE HOPE ISLANDS, NORTH QUEENSLAND. By C. HEDLEY. (Proc. Linn. Soc. N. S. Wales, 1909, vol. 34, pp. 420–466, pls. 36–44.) An interesting paper treating of a rich and varied fauna. The Hope Islands are situated near Cooktown, just inside the Endeavor Reef. The writer states that more than 700 species were secured; 100 species are discussed in this paper, half of which are new to science. The figures are unusually fine in detail and sculpture.

DESCRIPTIONS OF NEW AND NOTES ON OTHER AUSTRALIAN POLYPLACOPHORA. By C. HEDLEY and A. F. BASSET HULL.

(Records Australian Mus., vol. 7, pp. 260–266, pls. 73 and 74, 1909.) Four species are described as new.

A Revised census of the Terrestrial Mollusca of Tasmania. By W. F. Petterd and C. Hedley. (Records Australian Museum, vol. 7, pp. 283–304, pls. 82–87, 1909.) A complete revision of the species, with illustrations of all Tasmanian land shells hitherto unfigured. *Cystopelta bicolor* is described.

The list of San Bernardino County mollusks in the November number of The Nautilus (Vol. XXIII, pp. 73–79) does not include *Lymnæa bulimoides techella* Hald. I found this species in considerable numbers during the summer of 1909, in Sec. 33, Tp. 2 S., R. 7 W., very near the county line, but the owner assures me that his property is in San Bernardino County. They were in a pond surrounding an artesian well. Dr. Frank C. Baker identified the specimens.—Junius Henderson, *Boulder, Colo.*

Note on the Summary of the Mollusca of the Peruvian Province.—There are some points in Mr. Berry's review of this paper which show that even those things which are obvious, or seem to be so, should not be omitted. In preparing this list it was not my intention to review the whole molluscan classification or nomenclature, which would have taken as many years as the list I prepared took months. In those groups which are not familiar to me, I fell back on the only modern classified lists of the Cephalopods and Nudibranchs, namely those of Hoyle and Bergh, as indicated in my bibliography; the experience and reputation of these authors being such as to require no apology for accepting their results. In the case of the *Bolitæna* I followed the spelling of the name as given in the work referred to, the Bulletin of the Museum of Comparative Zoology. *Polypus fontaineanus* was named after N. Fontaine, and though it happened to be misprinted *fontanianus* in the first fasciculus of Orbigny's work, and this misprint was copied on the plate by the engraver, the error was corrected in the index of the book somewhat later. Under these circumstances we are authorized by the rules to accept the correction, as Mr. Berry proposes to do in the case of *Turridæ*. However in the latter case since the derivatives of *Turris* in Latin (*turritus*) English (*turrited*) and so far as I know all other languages, accept the euphonic "t" in derivatives of *Turris*, I kept the earlier form which is more in harmony with *Turritellidæ* and similar accepted locutions. The illustrations of the work were intended for those interested in the identification of the economic shellfish and not for anatomists, and for this purpose Orbigny's plates are quite satisfactory. As Whewell remarked "We are none of us infallible, not even the youngest of us."—*Wm. H. Dall.*